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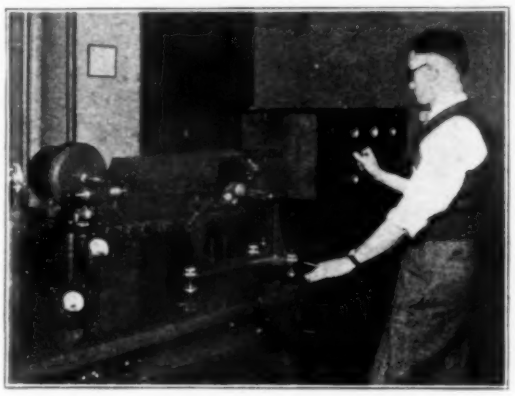
Castings Speed Photographs in Telephoto Process

WHEN Maitland and Hegenberger landed in Hawaii at 9 a. m., Pacific Coast time, on the morning of June 29, cameramen were waiting to photograph the famous army flyers as they completed the first successful nonstop flight from the mainland of America to the small islands in the Pacific. The plates were rushed to Honolulu, 26 miles away, developed, and



A Portion of the Telephoto Sending Apparatus

the pictures transmitted by radio to San Francisco, where they appeared in the afternoon papers. The photographs then were sped eastward by telephoto, the process of sending pictures by wire, and arrived in Chicago, Cleveland and New York at 10 p. m. Today, in this remarkable age of speed, newspapers reproduce photographs of events throughout the civilized world within 24 hours after the pictures are taken. Telephoto is the result of years of experiment and study by the army of men who daily are discovering many of the secrets of electricity. The telephoto system of the American Telephone & Telegraph Co. interconnects Boston, New York, Cleveland, Atlanta, Chicago, St. Louis, Los Angeles and San Francisco and makes it possible to send a photograph between any of these cities in 7 1/2 minutes. The visitor at any of the stations will find that castings play a prominent part in the construction of the sending and receiving mechanism and the panels.

Find Where Castings May Be Sold

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Stepping Up Production

By Pat Dwyer

How Molds Are Made, Handled and Poured

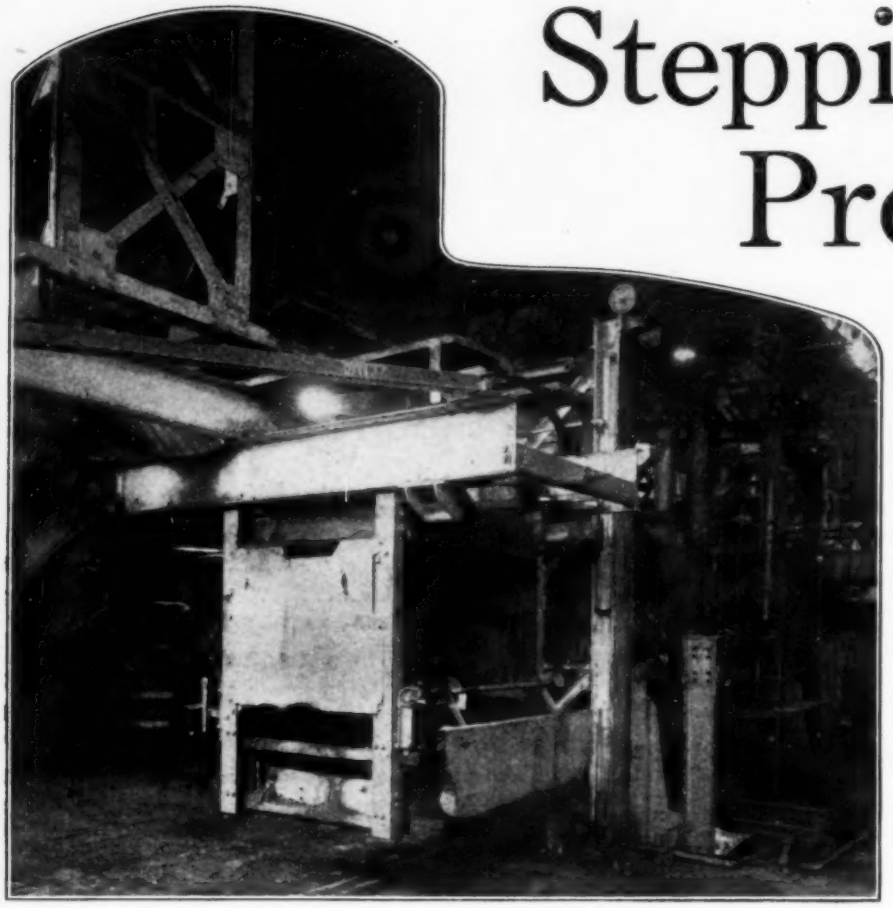

FIG. 1—ONE OF THE UNITS WHERE THE BOILER SECTIONS ARE MOLDED. COMPLETED MOLDS ARE REMOVED ON CONVEYORS

AN INTERESTING example of the manner in which mechanical equipment has been developed, adapted and installed for the manufacture of castings used in the heat radiation industry, is presented in the Austin Arcola plant of the American Radiator Co., one of the many plants operated by the company in this country and abroad and one of its four plants located in Buffalo.

For many years the production of heater castings, boiler sections and radiators, was regarded as one of the most highly specialized branches in

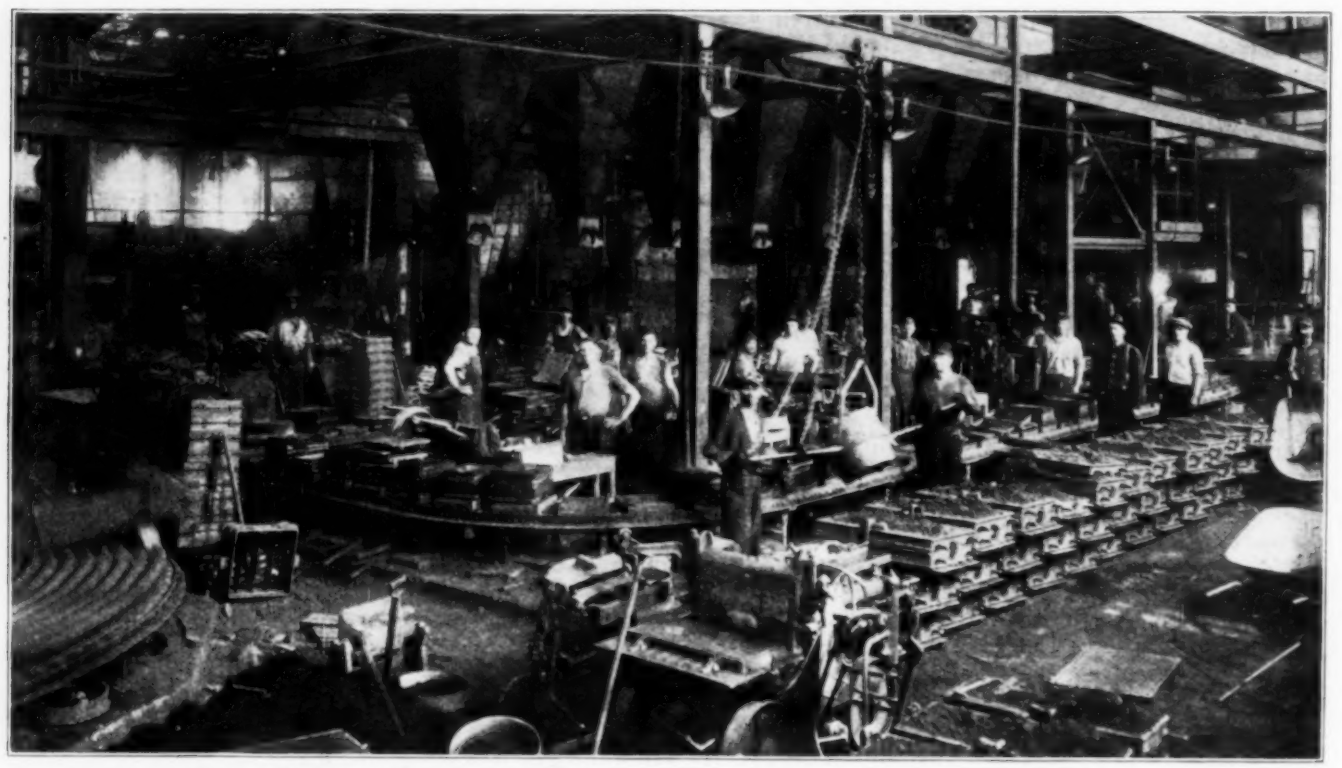

Fig. 2—Snap Flask Molds Are Made and Poured on a Power Driven Conveyor. Sand from a Central Supply Source Keeps the Sand Hoppers Filled Over the Molding Machines

Mechanically-II

THIS is the second article in a series of three dealing with the methods and equipment for making heat radiation castings at the Austin Arcola plant of the American Radiator Co., Buffalo. The third and concluding article on cleaning and assembling the castings will appear in an early issue.

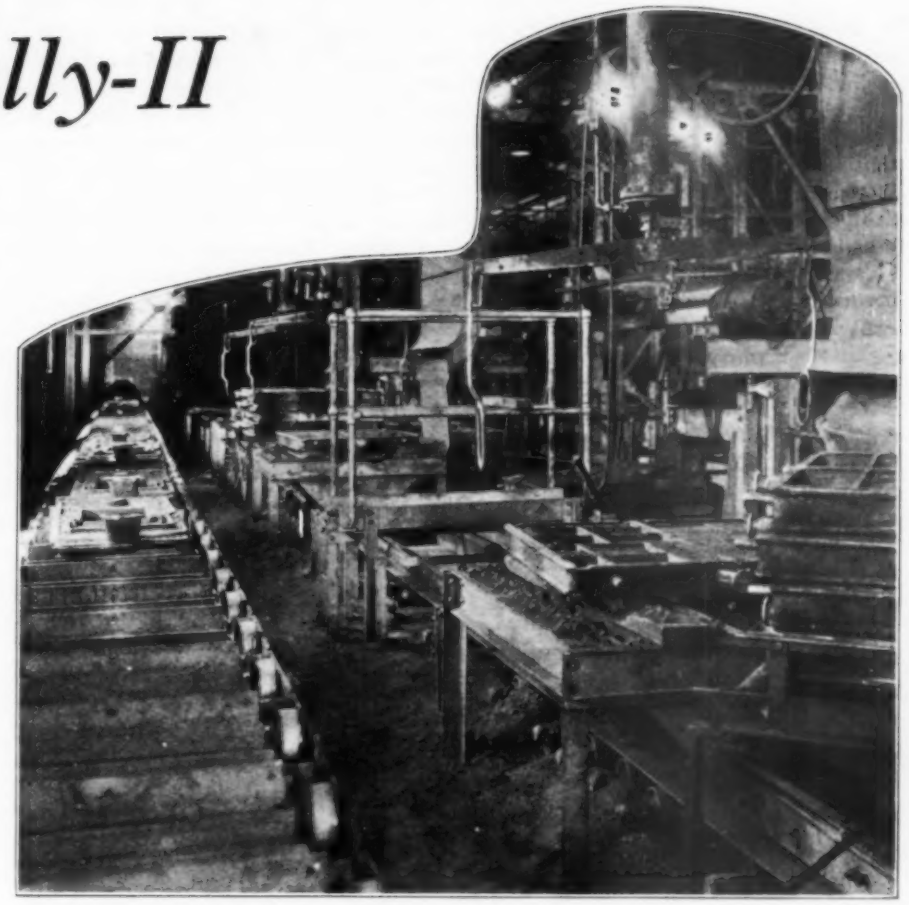

FIG. 3—MOLDS ARE SHAKEN OUT AT THE RIGHT WHERE THE SAND FALLS ON A MOVING BELT. CASTINGS ARE PLACED ON THE CONVEYOR

the foundry industry. A nice and discriminating sense of touch and a high degree of personal skill was assumed to be absolutely essential on the part of the operators. Plant managers and others responsible for production toyed with the idea of mass production on a mechanical basis, but for a considerable period decided that the character of the work and the product would not countenance such an innovation.

At present the production of these castings is, if anything, in a more specialized class than ever before, and singular as it may seem, the change

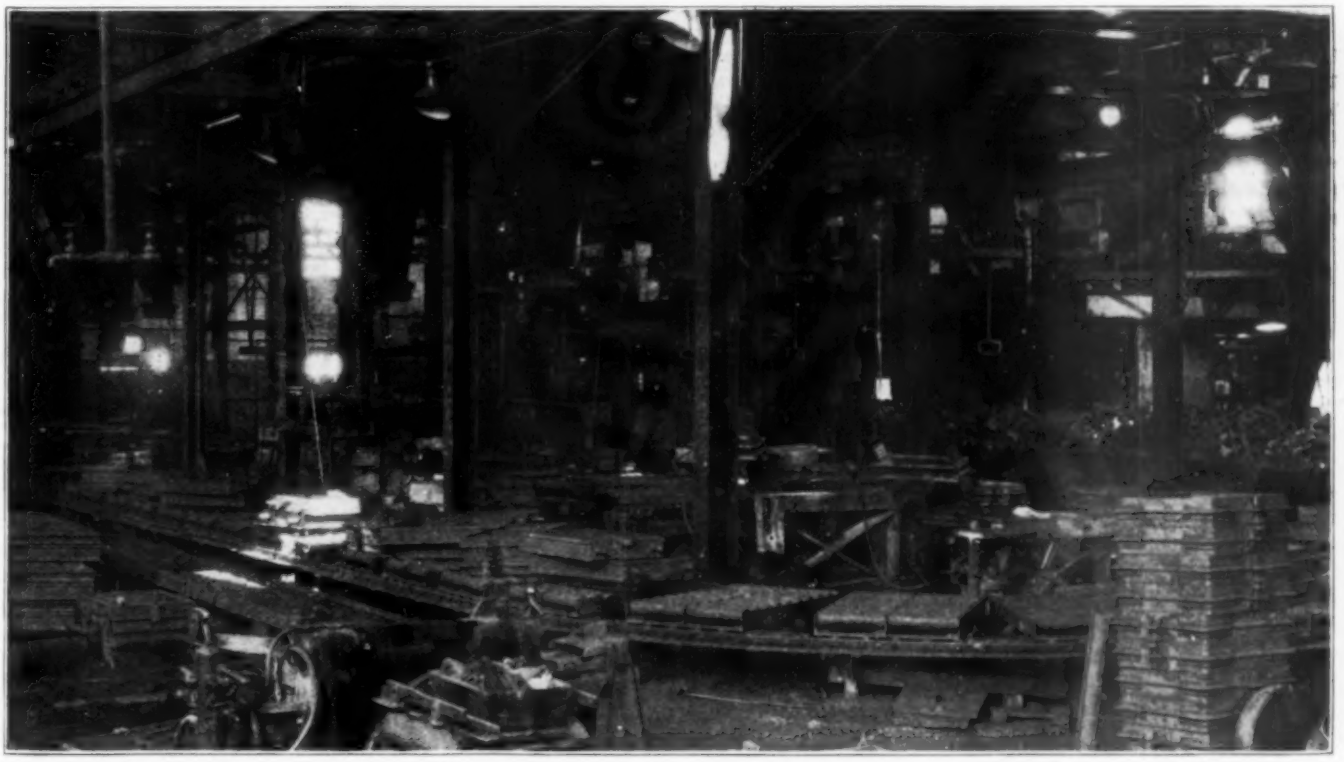

Fig. 4—*Third Conveyor in the Plate Foundry with Several Truckloads of Typical Castings in the Rear. Approximately 25 tons Per Day of Light Castings Are Secured from the Three Conveyors*

is owing to the fact that extensive mechanical equipment has been installed in nearly all the foundries where these castings are made. The specialization now lies in the fact that the castings are made in greatly increased quantities on the former floor space and in a manner that cannot be duplicated by manual labor either in cost or in uniformity of product.

Another peculiar feature is the ingenuity displayed in the designing and erection of special equipment to meet the special requirements of individual plants. By taking strategic advantage of slack periods, installation of equipment and change of methods interfered to little or no extent with production schedules. After the change was made, production automatically jumped ahead almost as readily, quickly a d easily as a motor car gathers momentum and eats up the miles after the driver shifts from second into high.

Usually, during the period of transition, the majority of the shop crew may be employed on construction work. This was the case at the Austin Arcola plant where regular foundry employes for the time being helped to put down concrete foundations and erect the steel work required for the conveyors, elevators, monorails, sand mixing and distributing equipment. Most of the material and equipment was supplied by the Link-Belt Co., Chicago, whose engineers in collaboration with the engineering staff of the American Radiator Co., had decided just what was required and how it should be operated to insure a definite tonnage of castings day by day.

General policy of the company allocates to each plant a definite output of finished product either as radiator or boiler units, or both depending on whether any given plant specializes in one product or engages in the manufacture of both. A monthly report sheet broadcasted to every plant from the head office and showing the standing of every plant from a multiplicity of angles, keeps each plant manager up on his toes and incidentally is reflected in the attitude of all the employes.

Activities in the Austin Arcola foundry were grouped under three heads: Radiators, boiler sections and miscellaneous small parts. A separate set of equipment was installed to meet the requirements of each department. Sand handling equipment, mold and castings conveyors, shakeout, cleaning and testing devices and assembly plant in the radiator division normally handles 20,000 feet of radiation each working day.

Fig. 5—The Pans Which Travel Around on the Conveyor Are Provided with Transverse Rollers Which Facilitate Loading and Unloading the Molds. The Shakeout Grating Is Shown in the Foreground

A similar set of equipment so far as the various items are concerned, but differing widely in size, scope and application has been provided in the department where the boiler sections are made on six independent producing units, each unit with a capacity of 360 sections per day from a crew of 7½ men.

The half man is not as great a mystery as might appear at first glance. The explanation is simple. Fifteen men work on adjacent molding units, seven exclusively on each unit. The odd man divides his efforts between the two stations.

In the third division, miscellaneous accessory parts, doors, grates, lids, etc., are made on 3 power-driven conveyors to the extent of approximately 25 tons per day. These conveyors constitute the chief point of difference between the equipment and method of operation in this section of the foundry and the others where the loads are pushed around on plain roller conveyors. Reference of course in this description is confined to the molding departments of the foundry. Power driven and gravity roller conveyors have been installed extensively for carrying the castings into, through and out of the cleaning room and through other operations that finally culminate on arrival at the shipping platform.

Six Molding Units

One of the 6 self-contained units on which the boiler sections are made is shown in the foreground Fig. 1. It includes two stripping plate molding machines located side by side on which the cope and drag patterns are mounted. A special type rammer, peculiar to the heater industry is employed to ram two molds at one time. A number of feet are attached to vertical rods actuated by cams at the upper end in such a manner that the feet rise and fall in regular sequence after each other and closely approximate the action of the molder in a former generation when he *jumped* or *stepped off* the sand with his feet instead of using a double rammer.

The rammer is suspended from a suitable frame work in such a manner that it passes forward and back over the molds and the moving feet compress the sand at each passage. The rammer may be adjusted at any height within reasonable limits and it is claimed that this device rams the sand uniformly and satisfactorily in this particular type of mold. Special merit is claimed for it in that it does not disturb the chaplets which are set in the pattern and rammed up with the sand in the mold. In experimental work a great deal of trouble has been experienced in getting the sand to pack properly under the chaplet head, also in preventing the chaplets from toppling over or from being pushed to one side. The gradual and progressive manner in which the sand is rammed with the walking rammer does not disturb the chaplets.

After the molds are rammed they are cored and assembled on a conveyor leading toward the gangway and with a capacity of 9 molds. Each mold is poured when it arrives at the end of the conveyor. The line with a capacity of 9 molds forms an elastic link between the molding machines and the pouring ladle. Usually the molds are poured as fast as they can be shoved to the end of the line, but occasionally the ladle may be delayed temporarily and then the molds accumulate for a time on the conveyor.

While the apparatus on which the molds are assembled and poured has been referred to as a conveyor, it is not a conveyor in the sense in which the term conveyor usually is understood. Each mold is mounted upon an independent truck which may be moved by itself or as one in a procession. One reason for this arrangement is the factor of flexibility which it introduces into an otherwise closely fitting and synchronized program.

Handled On Two Levels

The second and principal reason is that the molds are cooled and shaken out on suitable equipment located 12 feet above the main floor of the building. The mezzanine floor where this work is carried on is shown in Fig. 3. If another type of building had been available or if it had been necessary to erect a building to house the activities of a heater production plant, probably another plan would have been adopted. In this particular instance the two story installation was adopted as the best to secure maximum production from a given floor area in a long, narrow building.

After each mold is assembled it is pushed on its truck to the end of the track which may be noted near the right center in the illustration Fig. 1. Here a plate the same area as the top of the flask and attached to a vertical plunger actuated by compressed air, is pressed down on top of the mold. The pressure exerted by this plate holds the two halves of the flask together and also prevents the sand in the cope from straining upward under the static pressure of the molten iron.

Immediately after each mold is poured, it is lifted on an elevator to the upper level and pulled back to the shakeout station near the far wall of the building as shown in Fig. 3. A small air hoist suspended from a curved overhead runway is pulled into position by one of the two operators who attend each of the shakeout stations. The two men adjust a pair of slings on the cope and swing it over the mouth of a hopper where the sand is shaken out and where the sand falls on to a wide belt that carries it to the sand preparation plant near one end of the building and shown in Fig. 7.

The drag containing the casting then is placed on the shakeout station and the sand is rapped out of it. The red hot casting is picked up nonchalantly by the two operators and placed on a steel plate conveyor shown to the left in Fig. 3. The men wear leather pads on the hands and handle the castings so swiftly and deftly that the wear on the pads is little more than that experienced in handling cold castings. The empty flasks are loaded on roller conveyors, one of which may be noted to the extreme right in Fig. 3. This conveyor takes the empty flasks to an elevator which discharges them on the lower floor level where they are allowed to cool for a short period before they again are put into service.

Three power driven conveyors in the plate foundry are shown respectively in Figs. 2, 4 and 5. The first is for snap flask work, the second is for light plate work and the third is devoted to a miscellaneous line of small parts.

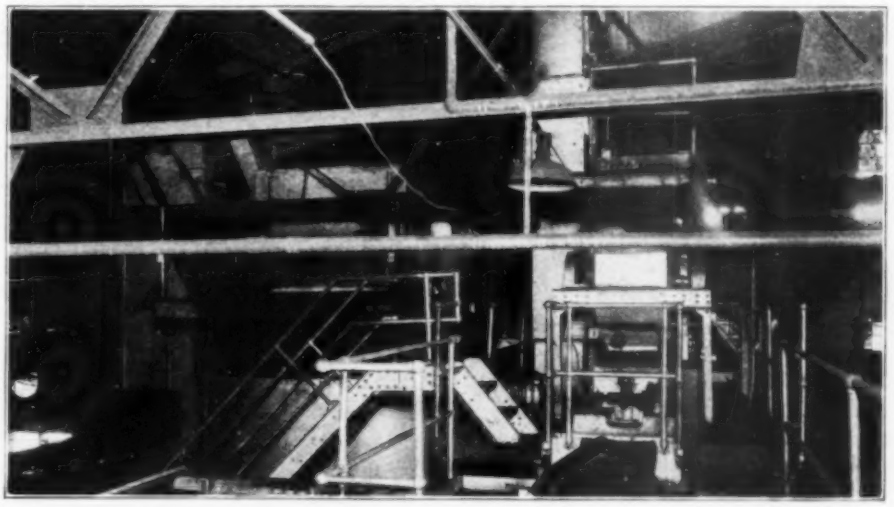

Fig. 6—Sand Conditioning Machinery, Including the Upper Part of the Elevators, Revolving Screen, Revivifier and Parts of the Distributing Belts

Several truck loads of castings from this conveyor may be noted at the extreme right center of Fig. 5.

Interesting features in connection with the conveyors may be noted in the three illustrations, but particularly in Fig. 5, which shows the relative positions of the molding machines, the shakeout station, sand supply hoppers and the manner in which the roller cradles are mounted on the traveling conveyor. The roller type conveyor principle has been adapted in an ingenious manner to carry the molds on to the conveyor at the various molding stations; to discharge them from the conveyor at the shakeout station and to carry them past the pouring stations from any given point.

The main frame of the conveyor, supported on suitable pedestals 12 inches above the floor level encloses an oval space approximately 25 x 50 feet. The frame itself is in two parts like the rails on a railroad, but instead of a rail, each part is made of a series of 4-inch rollers, 12 inches in length and supported between two facing angle irons. On the turns, these rollers are set at a suitable angle to facilitate the passage of the loaded trays.

Instead of a plain flat plate, each tray, designed to carry a mold, is turned up at two sides and these sides are pierced with a series of small holes to carry the spindles of a set of small rollers that serve as a foundation on which to place the molds. The bottom of the tray for a short distance on the inner and the outer end, rides on the track rollers underneath. A sprocket chain attached to the center, bottom side of each pan pulls the load around the circuit. The pan rollers facilitate loading and unloading the flasks and the short rollers underneath carry the load with a minimum of friction.

A short section of roller conveyor is mounted in the space between each molding machine and the main conveyor. As each mold is made it is slid easily into place on one of the moving pans. The pan carries it around to the pouring station and eventually to the shakeout grate in the floor on which the mold is dropped with a minimum of effort. All the attendant has to do is to give the flask a pull. It rolls readily from the pan and falls on the grating. The fall loosens most of the sand and the remainder is jarred loose on the grizzly type of grate which tosses the flask around until it is emptied. The sand falls into a hopper and ultimately is carried to the sand rejuvenation department where it is cooled, wet down, rebonded and returned for use at the various molding stations.

Sand conditioning and distributing equipment is shown in Figs. 6, 7 and 8. Owing to the thin section of the castings made in the foundry the sand in the molds is not burned to any appreciable extent and although the round trip is comparatively short it

has lost all its heat by the time it is delivered to the molding stations. Also a minimum amount of new sand is required to keep it in good working condition.

Sand from the shakeout stations is conveyed on a wide belt and discharged into a collection bin from which it is taken by a bucket elevator and fed through a revolving screen which removes hard lumps, pieces of scrap and any other foreign material. The screened sand falls upon a belt which feeds a piece of revivifying apparatus in which the sand is thrown by the paddles on a revolving wheel through a maze of rods suspended vertically from the cover. This treatment blends and aerates the sand before it is taken by another belt and discharged into a large storage tank.

A supply of sand in the storage tank affords an insurance against an accident of any kind that temporarily might hold up the sequence of operation at any stage in the circuit. Thus the molding program could go right ahead even if a temporary delay was experienced in pouring the molds or in shaking them out. The sand storage tank is a second elastic link in the otherwise rigid chain of production in which every link is designed to bear a definite load at a definite time. The assembly track of each molding station and the sand storage tank constitute more or less temporary breathing places where if necessary the slack may be let out or taken up. Where any factor temporarily out of step may catch up and catch step with the remainder of the procession.

A line of supply tanks over the various molding machines is kept filled with sand from the main distributing belt shown in Fig. 8. The belt passes over the top center of each tank and an adjustable plow diverts the sand into the open top. When the tank is filled the plow is raised and the sand on the belt is carried to the next point where a lowered plow indicates it is needed. An attendant walking back and forth on the steel balcony shown to the left in Fig. 8 takes notice of the amount of sand in each tank and manipulates the plows to keep the tanks replenished. Any excess sand which travels to the extreme end of the belt falls through a pipe on to the belt conveying the sand from the shakeout to the mixer.

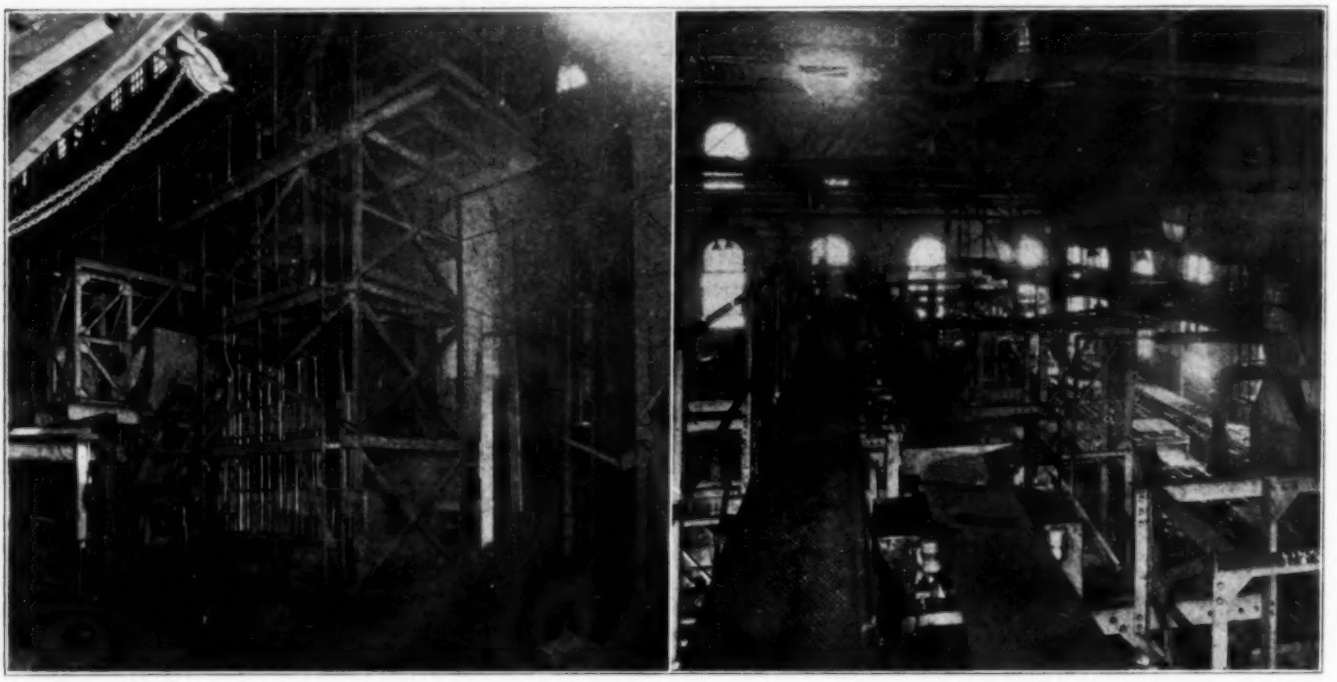

Fig. 7—Control Apparatus Sand Storage Tank and Other Parts of the Sand Handling Equipment on the Ground Floor. Fig. 8—Main Distributing Belt Located Above the Truck Type Molding Machines on Which the Boiler Sections Are Made

Foundries To Exhibit

Foundries in the Cleveland district will be well represented in the Ohio-Cleveland industrial exposition which opens at the Public hall Aug. 6 for a 23-day showing. Already fifteen have reserved space for exhibits; half as many more are expected to close within the next ten days.

The dominant position of the iron and steel industry in the Cleveland district insures that this section will be a point of interest for exposition visitors. A number of steel and metal products companies already have arranged for exhibits. Of these, the foundries constitute a considerable percentage.

The entire idea of the Ohio-Cleveland industrial exposition is to present a graphic picture of the industrial and civic greatness of Cleveland and the northern Ohio manufacturing district. Industry will dominate the exposition by sheer force of its numbers and from the fact its 12,000 mills and factories pay 1,000,000 wage earners one and one-half billion dollars annually for their part in the production of six billions of dollars of finished products.

Artistically set in Cleveland's great public auditorium, its new west wing and the broad plaza between, crowned by the 225-foot crystal-electric tower of jewels and enlivened by a pageantry of orchestras, bands, outdoor entertainments and broadcasts, this exposition will display its wares to the world in an exceptionally attractive way.

The foundry companies that have contracted for show space include: Allyne-Ryan Foundry Co., American Steel & Wire Co., Chain Products Co., Forest City Foundry & Machine Co., Eberhard Mfg. Co., Forest City Foundry & Mfg. Co., Henry Furnace & Foundry Co., Mathews Steel Castings Co., National Bronze & Aluminum Foundry Co., National Malleable & Steel Casting Co., Rickersburg Brass Co., Superior Foundry, W. S. Tyler Co., Walworth Run Foundry Co., Wellman Bronze Co. and West Steel Castings Co.

The Apprentice Problem Is Getting and Holding BOYS

By William Armstrong

WATERBURY FARREL FOUNDRY & MACHINE CO.,
Waterbury, Conn.

THE problem of finding and retaining foundry apprentices is much in parallel with the sportsman's perplexities especially those of the angler and the hunter. A skilled fisherman knows that he must adapt his bait to the fish, the water and the locality. He must have skill in the use of his tackle, and an intimate knowledge of the habits and peculiarities of fish. He knows that after hooking he may lose his catch by mishandling. Suitable equipment is necessary to the man who sets out to fish. He selects with care, knowing that bad judgment may lead to disaster, or at least to dissappointment, and he must play the game. Securing boys for apprentices requires the same skill, patience and well laid plans.

These similies indicate the basic principles and methods to be employed in securing boys for apprentices. A method applied successfully in Waterbury might fail in Philadelphia, or one that is satisfactory in Milwaukee might be unsuccessful in Cleveland, but basic principles are found applicable to all cases, no matter how divergent they may be.

Start with the conviction that it is needful to educate the parents in the value of a trade so that they may grasp the benefit to the boy, the industry and the nation. Then tell them how to proceed in putting the boy to a trade.

Be prepared to consider that the boy has no notion of what he wants to do. Get him thinking what he can do and where he should do it.

A dual purpose will be found in the initial stages of securing apprentices. It is necessary to educate both the parents and the boy to the advantages to be derived from learning a trade, and what a trade means to them and their own prosperity. We have to get them to consider that trades are worth while occupations for any class; that artisans are the backbone of industry, and on industry depends the prosperity of the nation.

The medium for the transfer of plans to the parents and the boys is the local press, preferably a Sunday newspaper. Live, interesting and descriptive articles with illustrations appear to be the most successful and by far the least costly method. Printed brochures and pamphlets are costly and seldom read thoroughly unless the recipient is educated to the idea.

First sell the idea to the parents and the boys will begin with the utmost faith in the foundry and in foundry apprenticeship. A clearly defined vision and a sound policy must precede all definite attempts at securing apprentices. Every employer who backs his offer with a properly drawn indenture, insuring fair pay, steady work and a good training in the trade outbids the employer who does not. He starts with a rock foundation of good will and good faith styled a *square deal*. Once these principles are established good progress is noted for interest is created, and interest is the resounding note to strike.

Assure Steady Work

Speaking of inducements to attract boys to trades, it is not worth while to talk to them about their remote future, but they have a keen eye for the main chance—money—and do not mind spending 3 or 4 years with small pay if the work is steady, and there is promise of good pay as a journeyman. For this reason apprentice pay should not start too high as an inducement, and it should be so apportioned that when the apprentice becomes a journeyman a substantial increase is permissible without adverse comparison with the shop standards. The premium time plan is good for the regulation of apprentice pay, permitting flexibility outside the pay schedule, and at the same time rewarding merit. Consideration of this kind has a tendency to hold young men after completing their apprenticeship, and such young men will improve the morale of the shop.

A point worth mentioning here is that many employers think that they can lay off apprentices as they do journeymen. This is poor policy as such firms will discover to their cost. The apprentice is engaged on different terms from the journeyman, and is on quite a different plane, and a different policy is necessary for his management and control.

Assuming that the boy has become apprenticed and it is time to set about retaining him. The first thing to be remembered is that the boy is human, balky, critical, analytical and also suspicious. He easily is frightened off the job or otherwise *queered* during the first few weeks. There are many factors constantly at work trying to separate the potential apprentice from the job.

Many of these troubles may be overcome by management. Set aside a portion of the foundry for apprentice training. The boundary lines may be imaginary. This section should contain bench, side floor, and main floor space. Then secure a first class molder as working instructor. He must be of the right temperament. Give him full charge of the boys with no direct superior except the head of the training department.

The boy is taken in hand and instructed progressively in all the preliminary steps of the molding trade and eased along until he is accustomed to the work, the men and the routine. He is given simple molds to make and every mold he makes should be poured. He helps during the pouring, his mistakes are pointed out and proper methods shown. He strips his own work, and any defects are studied. He is shown his work after cleaning and sandblast. He is on a production basis from the start. He sees what the journeymen are doing on the same class of work, can compare his work with others and he is given to understand the value of his work as a unit.

Another feature is that he is never permitted to be in doubt, and is given to understand that he is more at fault for not asking questions than for spoiling a job. Every encouragement is given him to increase his knowledge and to seek information. After his probation period of six weeks is served and he has proved suitable for apprenticeship, he is indentured. His training program is explained again, and he buys a set of tools which is sold to him at cost. The related instruction starts as soon

as his contract is signed, and it is arranged to keep pace with his shop work. The shop work starts with the bench and progresses through to side floor and main floor of the apprentice section. He is broken off from time to time and given instruction in core making. The related work schedule is progressive, starting with arithmetic and finishing with simple chemistry.

During this time the apprentice is beginning to have confidence in himself and his work, and begins to see the value of it. He gains confidence in the employer's good intentions, and the advantage of his training as an investment of his time and labor. He gains by assimilation, shop speed, shop atmosphere and methods. All questions are freely answered and all grievances dealt with and adjusted. Discipline is enforced without harshness, but it is maintained nevertheless. It is one of the props of good management, and there is no favoritism. Try by fair dealing to obtain full confidence.

Foundry boys require to be more robust than those in training for machinists, and care is taken to select boys of good physique and good eye sight and from 16 to 18 years of age. They should pass a rigid medical examination by the plant doctor. Preliminary education may range from 7th grade to high school graduates. Selection is made during a probationary period on merit.

The high school boy does not always show to more advantage than the grammar school boy. The latter often is more willing to work.

An apprentice should be given an examination on completion of his course. The examination should be sufficiently rigid to serve as an entrance examination to a school of technology or college of engineering. If he should pass this examination and wish to climb higher it should be possible for him to get college training with all expenses paid. The industry should get better men and better leaders than the present methods of training provide.

Melt Small Quantity of Metal in Crucible

Question: Occasionally I find it necessary to melt small quantities of brass and iron in a crucible and I should like to have some information on the following points: 1—Where can I buy Connelsville coke in 500-pound lots. None of the dealers I have approached will sell less than a car load. Can I use anthracite coal? Is the gas from hard coal harmful to the metal? 2—How are motorcycle cylinders made? Please give full directions. 3—After melting a small heat of gray iron in a crucible I find a considerable amount of residue in the bottom. Is this a normal condition? Should I add a small quantity of fluorspar or some other form of flux to the charge?

Answer: From the general character of the inquiry we are inclined to the opinion that you have had no previous foundry experience and probably only have occasion to make a repair casting now and again. Under these conditions it is rather difficult to supply instructions that will be of any service. You probably are familiar with the saying "Every man to his trade" and certainly we know of no trade that requires more skill, knowledge, training and experience than the trade of molding when the term is applied to the production of miscellaneous castings in different metals. We are enclosing a list of technical books on the foundry industry and suggest you procure one or more. To answer your questions fully would consume more space than we have available. Taking your questions in the order they are presented the answers briefly are as follows:

1—We know of no place where Connelsville coke can be bought in 500-pound lots. Whatever chance you might have in the vicinity of ovens you have none in your isolated district. Anthracite coal is perfectly satisfactory fuel for crucible melting. 2—Motorcycle cylinders are made in cores from a split pattern mounted on a stripping plate. The vanes are stripped through the plate before the block of sand is removed from the pattern plate. 3—A small quantity of flux will help to liquify the slag and clean the crucible.

Exchange Greetings

The following cablegram was sent to the Institute of British Foundrymen by the American Foundrymen's association on the occasion of the annual convention of the British association at Sheffield, England, July 5 to 9: "American Foundrymen's association extends heartiest best wishes successful conference Institute of British Foundrymen."

To this message of greeting, J. T. Goodwin, Sheepbridge Coal & Iron Co., president of the Institute of British Foundrymen has replied as follows: "Institute British Foundrymen conference Sheffield thanks American Foundrymen's association for good wishes congratulate your association upon continued success."

Old Road Has Cast Iron Marker

TODAY, when the yearly expenditures of our government are measured in terms of billions, we may look with scorn on the cost of a public improvement costing a mere $1,800,000. *However, when Congress undertook the construction of the National Pike in* 1806, *the taxpayers paid that amount for the first internal improvement of any magnitude. The pike started from the Cumberland and led to Pittsburgh, Wheeling, and Indianapolis. The prospective terminus in the west was the town of St. Louis, a small settlement located on the Mississippi river. The accompanying illustration, which is reproduced by special permission from the "National Geographic Magazine," shows a cast iron milepost which was erected in the early days of the National Pike. The post evidently was located* 12 *miles from Cumberland and* 119 *miles from Wheeling.*

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Explains Brass Metallurgy-I

Type of Furnace Employed, Kind of Scrap Used and the Chemical Composition of the Alloy Melted Affect the Resultant Product—Desulphurization Is Accomplished with Sodium Carbonate

By Edmund R. Thews

OF ALL metallurgical processes used not one has remained practically stationary for as long a time as the brass melting process. Few changes have been effected in the production of brass alloys until about the beginning of this century. The chief difficulty of the process, the volatilization and oxidation of relatively large amounts of zinc had come to be regarded as inevitable. The only precautionary measure taken consisted of the addition of some easily fusible slag forming materials which inhibited or decreased the access of the air to the metal. However, this did not prevent to a sufficiently large degree volatilization of the zinc and its escape into the furnace atmosphere. After the introduction of the crucible furnace and the practical replacement of the primitive specimens of reverberatory furnaces, the art of brass melting appeared to have attained its highest possible state of development.

However, many decided improvements have since been effected in the development of the old types of furnaces and in the construction of new ones, as well as in the methods of melting and pouring the metal. The crucible furnaces were made movable and tilting, preheaters (charging funnels) were installed and the methods of heating the crucibles modernized. Considerable progress also was made by the introduction of the stationary and, later, the tilting oil furnaces. These, besides shortening greatly the time of melting and pouring, decreased considerably the amount of zinc lost by volatilization and oxidation.

Keeps Oxidation Losses Low

The most modern brass melting furnace is the electric furnace. The following types of furnaces now are being used for melting and remelting brass alloys: Reverberatory furnaces, coke, gas, and oil fired; crucible furnaces, coke, gas, and oil fired; stationary and tilting oil furnaces; electric arcs, resistance and induction furnaces.

To produce a satisfactory alloy, the following general principles must be observed and applied with great care.

The oxidation of zinc and the other constituents of brass alloys should remain as low as possible, since this not only represents a straight loss of metal values, but causes the contamination of the melt by the fine particles of tin and lead oxide, etc. These impurities, if not sufficiently removed before pouring, will impair seriously the quality of the castings produced.

Loss of metal from this source is large in remelting brass castings and brass scrap, particularly small sized material, such as turnings, shavings, etc. For this reason such material should never be added except in the briquetted state. The degree of oxidation of brass alloys is determined mainly by the following three factors:

This is the first of a series of three articles on various phases of brass melting and metallurgy. The author, Edmund R. Thews, is a consulting metallurgist, Berlin, Germany.

a) The type of melting furnace used, that is to say, the relation of the surface to the quantity of metal, the nature of the furnace atmosphere above the metal surface, the rapidity of melting and pouring, the intensity and nature of the heat applied, and the relative position of the source of heat to the surface of the metal.

b) The chemical composition of the brass alloys melted. The higher the percentage of zinc and the larger the percentage of gases in the melt, the more pronounced the loss of zinc. This latter influence is due to the high vapor pressure of the zinc at the high temperatures prevailing in brass melting. The boiling point of pure zinc lies at about 1700 degrees Fahr. and the vapor pressure at this temperature is equal to one atmosphere. On alloying with large amounts of copper, the vapor pressure is decreased correspondingly, but still it will remain sufficiently pronounced to make itself evident under ordinary melting conditions.

If a carbon rod is introduced into a brass containing 35 per cent of zinc at a temperature of about 2100 degrees Fahr., vibration of the rod will be caused by the development of gases at the surface of the rod. Therefore, it is evident that at such temperature the metallic bath at rest has exceeded the equilibrium of vapor tension. On introducing the carbon rod, the tension is released by the bubbles of air attached to the rod. The same phenomenon will be caused by an excess of gases in the melt which as soon as part of the gas is freed from solution by cooling down the metal to the freezing point, etc., will cause the release of the excessive amount of zinc held in solution by supersaturation.

Apart from this effect, there is the direct influence of oxygen, the exact nature of which as yet has not been determined definitely. The oxidation of the zinc and the presence of zinc oxide within the metal probably is not due to the absorption of gaseous oxygen but to the effects of surface oxidation during melting and to the introduction of zinc and copper oxides by the addition of oxidized ingots and scrap to the metallic bath. The older and more finely divided the scrap the larger the relative amounts of oxides carried into the melt, forming the zinc oxide inclusions typical of these alloys.

Influence of Scrap

c) The influence of the addition of scrap metal on the loss of metal by oxidation has been shown most effectively by the experiments of Schulz and Winkler in *Metall und Erz*, Vol. 16, 1919, who compared the respective losses of zinc and copper in a charge composed of 33 per cent virgin metal and 67 per cent scrap (sheets and borings) with that of another charge containing 20 per cent virgin metal and 80 per cent scrap. Results obtained are presented in Table I.

The conclusion formed by some authors that the oxides found in brasses are practically exclusively due to inclusions does not appear to be disproved as others claim—that the addition of deoxidation agents, such as

phosphor-copper, causes an almost immediate increase of temperature and fluidity of the melt. Since at the relatively high temperature of the bath and in view of the strong affinity of phosphorus for oxygen at these temperatures, this exothermic effect may be obtained by the reactions of the practically semi-gaseous phosphorus with the oxides of tin, lead, etc. present in most brass alloys.

Attention should be called to the fact, that zinc oxide cannot be reduced by phosphorus at any temperatures attained in brass melting. However, this fact is of theoretical interest more than of practical importance, since on account of the low specific weight of zinc oxide (5.4) it is not found in perfectly fluid brasses except in traces only. Zinc oxide inclusions occasionally found in brass castings are washed into the castings during pouring and trapped by the subsequent crystallization. This explanation is proved sufficiently by the arrangement of the inclusions within the structure.

The chemical and mechanical properties of the brass alloys should not be altered unfavorably by repeated remelting of the alloys.

Apart from superheating phenomena, which will be discussed later on, and the oxide inclusions mentioned previously, such deteriorations are mainly due to the absorption of harmful gases and vapors, particularly of sulphur dioxide, which must be prevented. Elementary sulphur has also been found in brittle brasses although little is known about its chemical and metallographical state. However, judgment concerning the specific properties of the different modifications of sulphur and its compounds existing in brass alloys should be deferred until exact data on this point have been collected and listed for comparison.

Throughout the war thousands of tons of high grade brasses for the production of cartridge shells, turbines, etc. were produced in the Central European states with high sulphur coke without inducing pronounced deterioration of the properties of the material. This proves that the generally adverse opinion concerning the presence of sulphur dioxides is at least premature, and that there are good reasons for paying a little more attention to other constituents of the gases of combustion generally considered to be harmless.

Of these, carbon monoxide and dioxide, nitrogen, oxygen and hydrogen are the most important. The absorptive power of brasses, as well as that of most copper alloys, being largest in the case of hydrogen. According to Fr. Doerinkel, in *Metallbörse*, 1925, No. 3, as much as 30 units of hydrogen may, under certain conditions, be taken up by each unit of brass. General opinion, confirmed by Guillemin and Delachanal, that the free absorption of hydrogen by brasses does not induce any deteriorative effects on these alloys, should be made the subject of further researches.

Table I

Losses in Brass Scrap Melting Compared

CHARGE

67 Per Cent Scrap			80 Per Cent Scrap		
	Pounds			Pounds	
Pounds Material	Cu	Zn	Pounds Material	Cu	Zn
1243 Copper	1243.0	.....	715 Copper	715.0	.....
583 Zinc	.....	583.0	385 Zinc	.....	385.0
2574 Brass Scrap (72% Cu)	1853.3	720.7	2860 Brass Scrap	2059.2	800.8
1100 Borings	792.0	308.0	1540 Borings	1108.8	431.2
5500 Total	3888.3	1611.7	5500 Total	3883.0	1617.0
	YIELD				
5167.8 Ingots	3720.2	1447.6	4796.0 Ingots	3454.0	1342.0
59.4 Brass in dross	44.0	15.4	61.6 Brass in dross	44.0	17.6
50.6 Copper	50.6	.....	30.8 Copper	30.8	.....
			6.6 Scrap	4.4	2.2
5277.8 Total	3814.8	1463.0	4895.0 Total	3533.2	1361.8
Loss in pounds	73.5	148.7	Loss in pounds	349.8	255.2
Per cent loss,	4.05		Per cent loss,	11.0	

Should Be Desulphurized

Wherever there is reason to believe that the brittleness of brass castings produced is due to absorbed sulphur dioxide, the brass alloys should be desulphurized previous to pouring. Apart from some special methods suggested which in their present state of development command theoretical interest only—as the passing of hydrogen through the bath for the purpose of forming hydrogen sulphide—the method in general use today is to cover the bath with a fused layer of anhydrous sodium carbonate. The soda ash is mixed with equal parts of crushed charcoal and spread over the surface of the bath which is puddled quietly and evenly for a few minutes. The soda ash melts and combines with the sulphur and the sulphides in the alloys, forming sodium sulphide.

Slag Is Drawn Off

The slag formed is drawn off. The desulphurization of a charge of about 15 tons of brass requires two or three washings of about 100 pounds each of the mixture, the exact number of washings necessary in each case depending upon the amount of sulphur originally contained in the raw charge. Under ordinary circumstances, practically complete desulphurization is obtained usually by three washings.

The energy of gas absorption is expressed by the speed of absorption and the quantities of gases absorbed percentage of zinc contained, the temperature of the bath and the area of the metallic surface exposed to the action of the gases.

On lowering the temperature of the bath, the gases absorbed are not given off in accordance with this rule. The absorptive capacity of copper alloys for gases is influenced strongly by supersaturation phenomena, which are released only on complete solidification of the metal. Thus, the effects of superheating brass alloys cannot be eliminated by cooling down the melt to correct pouring temperatures. The only means of avoiding the harmful effects of superheating being the crystallization of the entire melt.

This method is used quite frequently for the production of large charges of special brasses but is found rarely in the average foundry, although it will eliminate effectively most of the reasons for the formation of porous castings, particularly in the case of small sections where the rapidity of cooling prevents the escape of the gases liberated from the castings.

These considerations lead to the deduction, that perfect efficiency in brass melting only may be obtained by excluding the gases of combustion from the melting chamber. If this cannot be carried out practically, the temperature of the bath should never exceed the minimum temperatures required for efficient treatment of the melts. The only type of furnace precluding gases of combustion is the electric furnace.

No generally valid data can be given for correct melting and pouring temperatures, even for alloys of the same composition. Since, apart from the percentage of zinc contained, the temperature is also dependent upon the percentage and kind of impurities present and, in a high degree, on the type of melting furnace used, it is

quite natural that in the electric induction furnace, where the source of heat lies within the metal and where neither excessive heat by direct contact with hot gases or by radiation, nor excessive amounts of oxygen exert their oxidizing influence upon the surface of the metal, melting temperatures may be raised considerably above those permissible for reverberatory melting.

The advantage of this possibility is emphasized still further that through the high temperatures permissible in induction furnaces, the time of melting and the period of contact of the surface of the melt with the furnace atmosphere is shortened considerably. This decreases correspondingly the amount of gases absorbed. In general it may be stated that the melting temperatures of brasses should not rise more than 300 degrees Fahr. above correct pouring temperatures.

Pouring temperature, the most important thermic factor in brass melting, always has been the subject of debate. General opinion varies less between the metallurgists of the individual countries but more between American, British, German, and French foundrymen as a whole. Opinion on this point in America and Germany appears to agree upon the general rule that the pouring temperatures of brass alloys should be as low as possible, without actually allowing the metal to freeze during pouring. This position also is shared by French foundrymen. While this rule is not applied to some special alloys, the range of exceptions is drawn considerably wider in England where, a number of alloys are claimed to give perfect mechanical properties only if the melt is poured at the highest possible temperatures.

According to Bamford, in the *Metal Industry* (London) Jan. 1, 1926, brass should be cast at high temperatures, but when casting an alloy containing phosphorus, it was found that better results, greater mechanical strength, higher densities, and greater elongation were secured if casting was done at a low temperature. For brass, a superheat of 25 per cent was better than a superheat of 15 per cent.

Possess Advantages

It is true that in this respect, brass alloys possess one inherent advantage over straight copper-tin alloys in that the latter are subjected much more to oxidation on pouring at high temperatures than the brass alloys which are well protected against direct oxidation by the zinc vapors generated. It is clear also that the higher the pouring temperature, the larger the quantities of heat stored in the casting and in the mold, and consequently the less rapid the solidification of the metal. Gases liberated by the freezing metal are given more time to escape and the structure of the casting is correspondingly less porous.

However, these theoretical deductions are not confirmed entirely under practical conditions. This is demonstrated by the growing conviction of large groups of metallurgists, that one of the most important factors in the casting of brasses as well as most nonferrous metals and alloys is rapid cooling. Several German authorities are suggesting artificial cooling of the molds, and a number of German works are casting brass ingots successfully in water cooled iron molds.

Every practical metallurgist knows that apart from the pouring temperatures proper, the soundness of brass castings is influenced strongly by a number of other factors, such as rate of feeding, character of molding, kinds of mold dressing employed, size of feeding heads, etc. It appears that these considerations indicate that the pouring temperatures should be just high enough to satisfactorily fill out the mold, the minimum temperature being determined by the composition of the alloy, the size and shape of the casting, and the temperature and character of the molds used.

The influence of incorrect pouring temperatures on the mechanical properties of the castings is shown by the experiments carried through by F. L. Wolf and William Romanoff in THE FOUNDRY, June 1, 1925, who in pouring an alloy composed of 50 per cent virgin metal and 50 per cent gate and sprues at correct pouring temperatures as well as at a temperature 100 degrees Fahr. above, obtained the differences in physical properties as shown in Table II. It has been stated that due to their metallurgically unfavorable chemico-physical properties, brass alloys always will contain metallic oxides. For this reason, all these alloys must be deoxidized if mechanically sound castings are to be produced, while, as a matter of course, oxidation itself must be prevented as far as possible throughout the process of melting. As a rule, the bath is covered with a layer of crushed charcoal or with dry coke breeze. Occasionally, a layer of anhydrous sodium chloride is used for this purpose, although appreciable decreases of oxidation losses hardly have been attained by this means. In any case, the protecting influence of this material is greatly increased by mixing the sodium chloride with anhydrous sodium carbonate and crushed charcoal. This provides a certain degree of protection against oxidation as well as against the absorption of sulphur dioxide and nitrogen while the brass is melting.

Table II

Effect of Pouring Temperature on Brass

FIRST TEST

Temperature	Tensile strength Pounds per sq. in.	Per cent elongation (2 in.)	Per cent reduction of area
Correct	27,550	14.6	15.3
+100° F.	16,316	7.5	6.4

SECOND TEST

Temperature	Tensile strength Pounds per sq. in.	Per cent elongation (2 in.)	Per cent reduction of area
Correct	25,800	27.6	32.9
+100° F.	25,475	14.7	18.7

The various deoxidizing agents used should answer the following requirements:

1. They must possess a considerably higher affinity for oxygen than all other components present in the alloy.
2. The oxides formed by the deoxidizing agents must be insoluble in the alloys, and
3. Must possess a lower specific weight than that of the melted alloys in order to enable them to rise to the surface of the bath.
4. Their boiling points should be as low as possible, remaining below the pouring temperature in any case.

The importance of the first three requirements is self-evident and generally recognized, in contrast to point 4, little attention having been paid to this question in literature.

Publishes Bulletin

Mathieson Alkali Works, Inc., New York, has issued a bulletin giving interesting data and directions for using its flux. This flux fuses at 1560 degrees Fahr. and is recommended to be added to the cupola charge. Advantages claimed are an active, fluid slag, less oxidation of metal, removal of sulphur, gases and oxide-slag inclusions. This tends to give a clean fluid iron.

How and Why in Brass Founding

By Charles Vickers

Will Not Stand Pressure

We have experienced difficulty making brass heads for our centrifugal pumps which are about 18 inches diameter, 1⅛-inch thick, machined to ⅞-inch. The castings weigh around 125 pounds. The mixture is ounce metal, and while the castings are expected to withstand a pressure of 400 pounds per square inch, they leak and bleed at 50 pounds. We have also tried 88-10-2 alloy and also the 90-10 with the same results. Would you suggest nickel in such mixtures, and what is the correct pouring temperature for the alloys we have named?

An alloy suitable for pressure work and which is frequently used for making pump plungers follows: Copper, 86.50 per cent; 15 per cent phosphor-copper, 2 per cent; tin, 9 per cent; lead, 2.5 per cent. The substitution of 1.5 per cent nickel for the same amount of copper would not be harmful and might possibly produce a finer-grained alloy, though that is a debatable point.

The 90-10 alloy can be made in two ways: (1) Copper, 90 per cent; Banca tin, 5 per cent; phosphor-tin, 5 per cent; the latter should contain 5 per cent of phosphorus, and it cannot be replaced by phosphor-copper and get the same results. (2) Copper, 89.50 per cent; manganese-copper, 0.50 per cent; tin, 10 per cent. The manganese copper should contain 30 per cent manganese and be *iron free*. The latter alloy is the strongest of the two and could with advantage carry 1 per cent of nickel.

There is no *correct* pouring point to any of the alloys mentioned, notwithstanding many fanciful ideas to the contrary held by amateur brassfounders. The manner in which the mold is made and gated, and the metal melted and freed of oxides is the important thing. The degree of permeability of the sand is another matter; a smooth skin on a heavy casting is usually suspicious as it frequently is accompanied by internal defects. A free, open molding sand, well ventilated flasks and bottom boards are things too frequently neglected and those who give attention to such ways of quickly freeing the gases from contact with the molten metal in the mold, usually experience the same difficulty in making a defective casting that others do in making a good one.

We note you mention nickel as a *deoxidizer*. It has no such value in bronze. In fact, the more nickel an alloy contains the more urgent is the need for a suitable deoxidizer to avoid porosity. This possibly may be due to the fact that nickel frequently carries sulphur, and of course copper always carries oxygen and the two elements react to form a gas which produces porosity. The heat deoxidizers for such alloys are those having a strong affinity for both oxygen and sulphur, and are compound deoxidizers. As a consequence of this knowledge there is no need for porosity difficulties with copper nickel castings.

Melting Phosphor Bronze

We would like a formula for a good grade of phosphor bronze. What is the shrinkage, and at what temperature should we pour a 40-pound casting? Also we want the same information about manganese bronze.

A good grade of phosphor bronze consists of copper, 88 per cent; tin, 10 per cent and phosphor copper, 2 per cent. Melt the copper under a charcoal covering if a crucible furnace is used, add the phosphor copper, and the tin last. Pour at around 2050 degrees Fahr. A considerable amount of common sense has to be used in regard to pouring temperatures, as the type of casting and method of gating influence the pouring temperature. Patternmaker's allowance for shrinkage is 0.125-inch per foot.

A manganese bronze can be made as follows; Melt 54 pounds copper and 2 pounds manganese copper under charcoal and when hot add 1.5 pounds iron. When dissolved, add 0.5 pound of aluminum. Then have 42 pounds of zinc broken up small and made warm. Add this to the molten metal gradually. When all is dissolved stir well and ingot. Remelt the ingots for the castings. Pouring temperature from 1950 to 2000 degrees Fahr. Patternmakers allowance for shrinkage on castings made from this metal is the same as that on steel, 0.25-inch per foot.

Wants Temperatures

Will you kindly advise the proper pouring temperatures for the following mixes: (1) 88 per cent copper; 10 per cent tin and 2 per cent zinc. (2) 80 per cent copper, 10 per cent tin and 10 per cent lead? We are pouring these castings at 1950 degrees Fahr., and find they do not wear as well.

There is no such thing as a *proper* pouring temperature for any alloy for the simple reason the temperature of the metal when poured into a mold depends upon the degree of fluidity that is necessary to completely fill the mold. An important factor in the case is the method of gating, or the manner in which the metal is introduced into the mold. A few years ago English scientists determined the *best* pouring temperature for 88-10-2 alloy to be around 2192 degrees Fahr., but this would be too hot for a heavy casting, and too cool for a thin one of large area, gated as tradition appears to demand molders must gate such castings, with broad thin gates attached to a runner located along the sides of the casting. The No. 2 alloy melts at 1735 degrees Fahr. according to Gillett, therefore a pouring temperature of around 1950 degrees Fahr., is reasonable for some shapes. However for the No. 1 alloy the pouring temperature given is low even for a heavy casting. Common sense ought to rule and that will teach us that an alloy at a temperature too low for complete fluidity will entrap and hold gases easily. Also any oxides present will be held, giving an inferior casting. The best results are obtained by melting rapidly, getting the metal hot in the furnace, pulling it out when hot, that is fluid. This would mean a temperature around 2300 degrees Fahr. for No. 1 alloy and about 50 degrees below that for the No. 2 alloy. This will allow time for skimming the metal, cleaning the sides of the pot when it is melted in one, and in the case of ladles, the chilling effect of the same will not cool the metal too much. If the metal is thought too hot when at mold side, a warm gate will quickly correct that defect, but adding phosphorus to pasty metal to give fluidity is never advisable, although sometimes it has been tried.

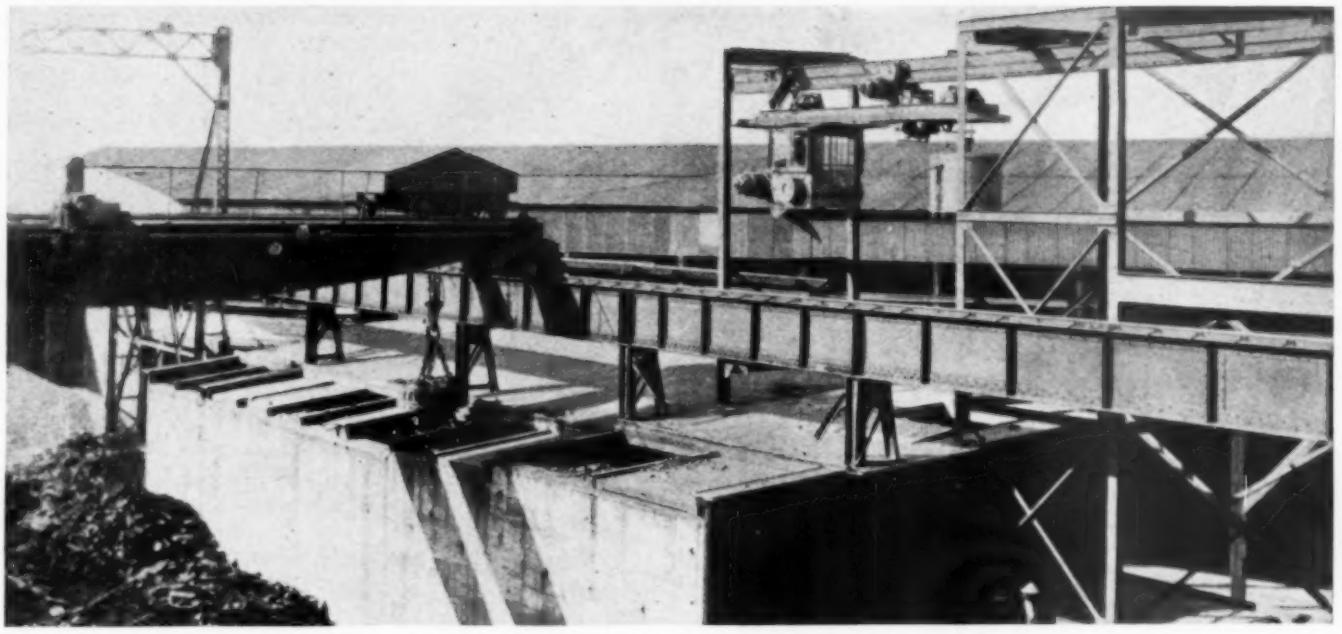


Fig. 1—General View Showing Yard Crane, Storage House and Charging Crane

Mechanical Charger Feeds *Three Cupolas*

By Frank G. Steinebach

MODERN civilization has been built largely upon the application of mechanical equipment to industrial, public and domestic service. Undoubtedly, the past century has witnessed greater strides in eliminating the drudgery of labor and increasing the pleasures of mankind than any similar period in the history of the world. Men, blessed with an inventive mind, have produced thousands of machines which gradually have supplanted the operations that not so long ago were accomplished by arduous labor.

Growth of this truly remarkable mechanical trend has been accelerated by progress made in developing electrical power. Ten years before the opening of the twentieth century, electric energy was used almost entirely for local lighting systems and for operating a few small street railways. From 1890 to 1900 a great advance was made, methods for producing electric power and many of the scientific principles were developed upon which that industry now is based. Today the work that is going forward to hook the power plants of certain sections of the country into large super-power companies indicates the future trend in the electric power field. Gradually industry is being electrified.

FIG. 2—THE BUCKET IS LIFTED FROM THE SCALE CAR BY THE CHARGING CRANE

The Westinghouse Electric & Mfg. Co. was one of the pioneers in the design and manufacture of electrical equipment applicable to the many types of machines employed in industry. Through the combined labor of various groups of men, many of them outstanding leaders in the field of electrical engineering, the company has taken an active part in the development of electrical equipment ranging from the large hydro-electric units found at Niagara Falls, N. Y., to the small sundries now used in the radio. For this reason it is fitting that the company should take the lead in applying electrical equipment wherever possible in its various manufacturing plants.

Early in 1925 the Cleveland plant of the Westinghouse Electric & Mfg. Co. installed extensive equipment for handling pig iron, scrap,

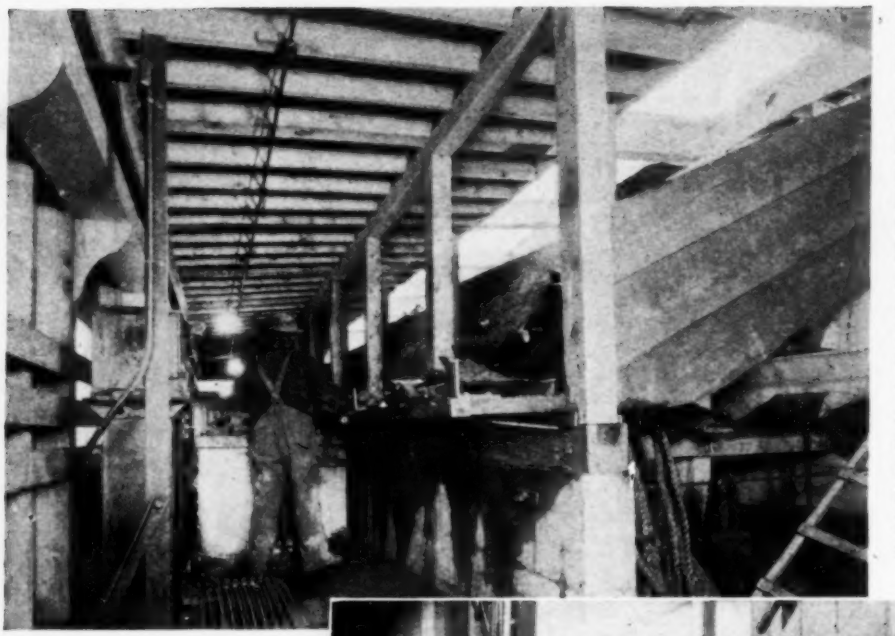


Fig. 3 (Above)—The Charge Is Made Up by Forking Materials From the Bins to the Charging Buckets

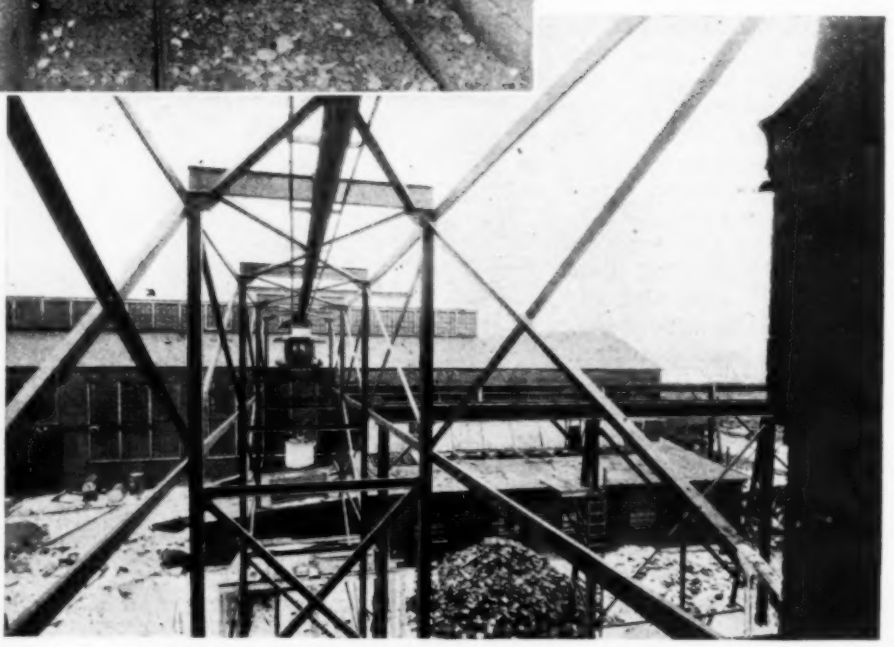
coke and limestone from the charging bins to the cupola which melts iron for the heavy shop. The unit consists of a covered storage building with bins and a special scale car, as shown in Figs. 2 and 3, and a complete electrically driven supola charger which operates on a monorail track supported by structural steel, as shown in Fig. 5.

Several factors were studied carefully by the company before the decision was made to install the necessary equipment to charge the cupola in this manner. A comparison of labor costs, both with and without the equipment, determined that a decided saving could be made by charging mechanically. Also it was found possible to charge the cupola more uniformly and without excessive wear on the cupola linings. Mechanical equipment also was found advisable from the standpoint of the welfare of the men. The excessive heat encountered on the charging floor in the hot summer months often made it necessary to employ two crews working in relays of from thirty minutes to an hour each. All labor on the charging floor is eliminated by the mechanical system, and only the crane operator approaches the cupola.

In this installation the pig iron, scrap, coke and limestone are loaded into the bins, shown in Fig. 3, by an electric magnet or grab bucket with an overhead yard crane. The raw materials are unloaded by the same crane directly from railroad cars which are spotted on a switch from the New York Central railroad near the storage house. The charges are made by loading the various materials into the charging bucket, which is carried the length of the storage house on the scale car made by the Atlas Car & Mfg. Co., Cleveland, and shown in Fig. 3. After the charge is prepared, the bucket is carried on the car to one end of the room, which is located directly under the crane runway. The charging bucket then is picked up by the cupola charger, made by the Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., as shown in Figs. 2 and 5. The charge is carried to the cupola, dumped and the charging bucket is returned to the storage house and lowered to the scale car. In the meantime, the crew in the storage house has prepared another charge in a second bucket and this is picked up by the charging crane and the trip to the cupola repeated. Only two charging buckets are required in the operation of the system.

When the cupola was charged by hand, four men were required on the charging platform, four in the yard, one to run the elevator and one to operate the railroad car upon which

Fig. 4 (Left)—The Mine Car Is Operated Electrically. Fig. 5 (Below)—In the First Installation the Charging Crane Moves in a Straight Line From the Storage House to the Cupola



the materials were hauled from the yard to the charging platform. With the mechanical equipment for charging the cupola, four men now do the work formerly requiring eleven men. Three men work in the storage house to make up the charges in the buckets and one operates the electric cupola charger. The company expects to be able to eliminate one man in the storage house so the work of charging will be handled by three men.

The three men come to work at 6 a. m. and first patch and repair the cupola. At 9:30 they go to the storage house to start preparing the charges. The blast goes on at 12 noon and the bottom is dropped at 4 p. m. The four men daily handle a charge of 50 tons in 4 hours and if necessary could handle 60 tons in the same period. Naturally, the yard crane operator was needed with either method of charging since he unloads the material from the railroad cars. An extra man assists the yard crane man for a few hours each day while the bins in the storage house are being filled, and during the remainder of the day is employed in cleaning and loading outgoing cars. Of course a portion of the time this man must be included in the cost of charging the cupola.

Results obtained in operating this charging equipment for approximately eight months convinced the Westinghouse company that it would be advisable to use mechanical equipment to charge the cupolas supplying the iron to the light castings shop. Consequently, plants were drawn incorporating many of the features found in the first installation. After using the original installation for eight months, any weak points of course were apparent, and these were remedied in the new equipment. Construction work was started late in the fall of 1926 and the unit was complete and in operation on Jan. 1, 1927.

Fig. 8 (Above)—The Large Dust Arrester, Which Created a Problem in the Design of the Charging Installation, Is Shown in the Background

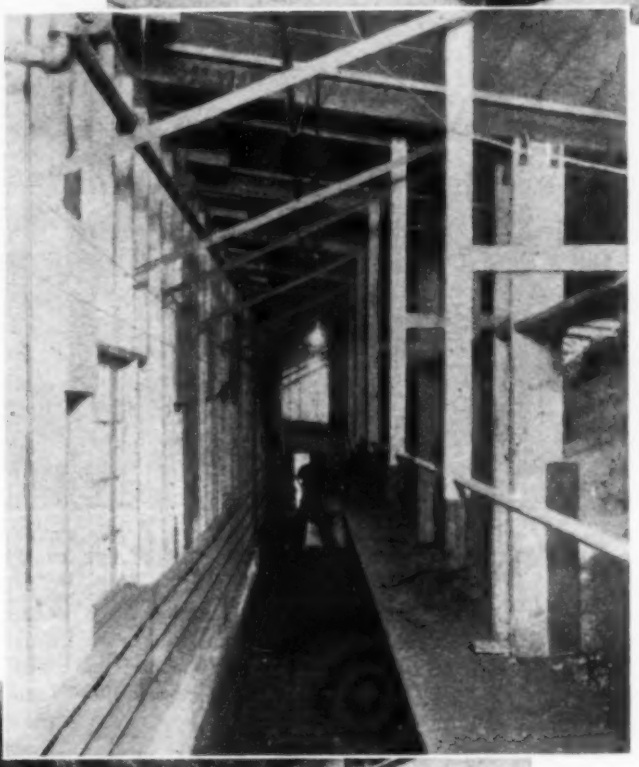


Fig. 6 (Below)—The Cupolas Are Used on Alternate Days. Fig. 7 (Right)—The Scale Car May Be Operated the Length of the Storage House

Several interesting problems required solution in the design of the later unit. Metal for the light castings shop is melted in three cupolas, one cupola being employed every third day. The first problem was to construct a system of overhead track so that the same charging unit could be used for any one of the three cupolas. A general idea of the monorail track construction used to charge the three cupolas may be obtained from a study of Figs. 9 and 10. The cupola charger is shunted to any one of the three cupolas by two switches in the track system. The construction of the switch used may be noted in the immediate foreground in Fig. 9.

The second problem arose in determining the point of outlet from the charging platform to the storage

yard. A large dust arrester unit is located on the outside of the building immediately in the rear of the cupola charging doors as may be noted in the background of Fig. 8. An elevator from the ground floor to the charging floor also is located in the rear of the cupolas. It was thought advisable not to move these two pieces of equipment, especially the dust arrester unit, and the track was brought out on the north side of the dust arrester, as may be seen in Fig. 8. This is the nearest point to the cupolas not obstructed by equipment. However, it was necessary to cut a corner from the dust arrester system to secure this outlet.

Moving the outlet to one side of the charging floor necessitated the construction of several rather sharp curves in the monorail track leading from the yard to the cupola. These curves may be seen in Figs. 8, 9 and 10. However, no trouble is encountered in traveling around the curves with the electric charger. The time required in going the additional distance, due to the slight increase in the length of necessary track, is not a factor, since the charger is not operated to capacity at any time.

In describing this installation in detail, it will be well to start with the raw materials entering the yard and follow through the various steps until a charge is deposited in the cupola.

Pig iron, coke and limestone are delivered to the yard in railroad cars. The sidetracks from the New York Central railroad parallel each other across one end of the storage yard, as may be noted in Fig. 8. The materials are unloaded from the cars by the crane, shown in the illustration, and placed in the storage yard in the foreground or into the bins of the storage house.

The coke and limestone are unloaded by an electric motor operated grab bucket built by the Hayward Co., New York, and shown in the foreground of Fig. 8, and the pig iron by an electric lifting magnet built by the Cutler-Hammer Mfg. Co., Milwaukee. Return scrap is hauled from the foundry on an industrial track and delivered to the yard crane at the end of the yard directly adjacent to the foundry.

The company expects to construct yard bins soon to hold the stocks shown on the ground in Fig. 8. The bins will average about 150 square feet of floor space each and will be 4 feet high. They will be built of heavy wood, supported by rails set in concrete. This system of bins will add materially to the capacity of the storage yard and at the same time will assist in keeping the various classes of raw materials separated.

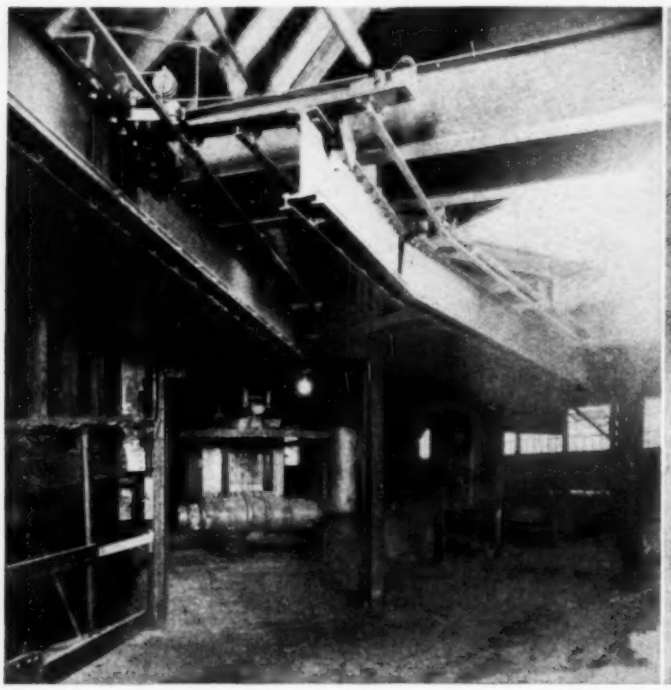
The storage house, which contains the bins and scale car, is shown at the right in Fig. 8 and in Fig. 1. The building is 80 feet long, 18 feet wide and is built with the roof sloping toward the bin side, as may be seen in Figs. 1 and 8.

The bins are concrete and have special metal doors at the top. Each door is equipped with a counterweight at the high side of the building to assist in holding the doors open. The operator in the yard crane opens the doors by pushing them up with the lifting magnet. Similarly, doors are closed by the operator using the magnet, thus eliminating the service of one man taking care of opening and closing the doors. The doors also may be opened by pulling a cord inside the building.

The bins in the storage house usually are filled late in the afternoon after all of the charges have been assembled. At that time the men who work on the scale car on the inside of the house, are through with their work and out of the way so that they are not in danger of being injured by any materials rolling down the bin inclines.

Interior views of the storage house are shown in Figs. 4 and 7. Eleven bins are built in this building, of which two are used for coke, four for pig iron, four for scrap and one for limestone. Each of the pig iron bins has a capacity of 10 tons. The average bin is 6 x 11 feet and slopes toward the scale car track. All bins are floored with steel plate, except in the pig iron bins where 20-pound rails in the inverted position are attached to channels by special clamps.

The method of filling the buckets is shown in Figs. 4 and 7. The scale car, which also is built by the Atlas Car & Mfg. Co., Cleveland, is driven by an electric motor on a track ex-



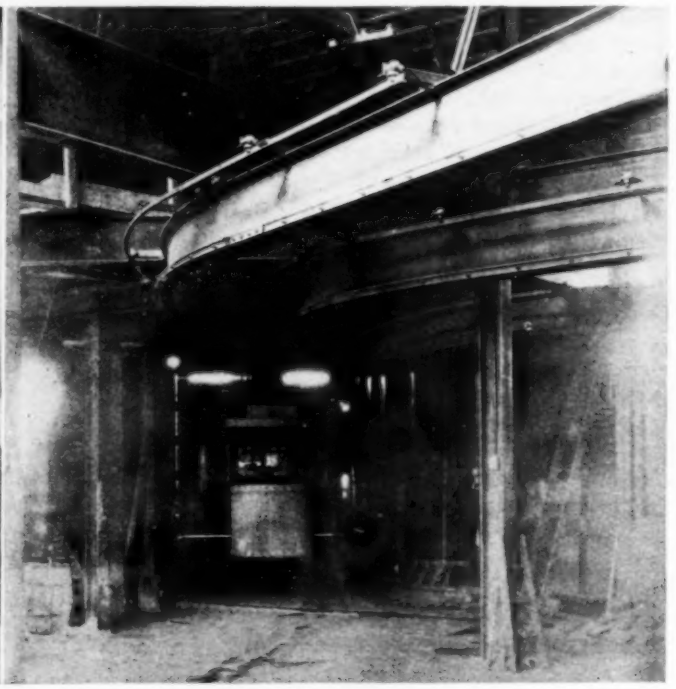


FIG. 9—THE CHARGER MAY BE SHUNTED TO ANY ONE OF THREE CUPOLAS BY TWO SWITCHES. FIG. 10—TWO DOORS, OPERATING AUTOMATICALLY, PROTECT THE PLANT IN WINTER

tending the length of the storage house. The distance from the rails to the bin platform, is 7 feet and from the scale car platform to the bin platform is 30 inches. The lip of the bin platform extends over the charging bucket about 11 inches, as may be noted in Fig. 4. This feature adds to the ease with which the materials may be forked into the charging boxes.

The beam box in the scale car has 6 beams each controlled by a lever on the side of the box. In making up the charge, one man on the car sets a lever on the box which regulates the amount of material of one kind to be used in the charge. The two operators on the car then fork material into the charging bucket until a bell on the scale car rings, indicating that the correct amount of material has been placed in the box. One operator on the car then sets the second lever on the beam box for the next material to be included in the charge, the car is moved to the proper bin and the operators fork that material into the charging bucket until the bell again indicates that the correct amount has been placed in the bucket. This procedure is followed until the entire charge has been completed.

Charging buckets are lowered upon and raised from the scale car through an opening in the roof at the end of the storage house nearest to the foundry. The opening in the roof and the electric cupola charger, made by the Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., are shown in Fig. 1. The track is 35 feet above the ground level and the end of the track, shown in Fig. 1, is 160 feet from the nearest cupola at the opposite end of the monorail system.

The charging bucket, after being hoisted from the storage house, is carried in the position shown in Fig. 1 to the cupola being charged. Since one cupola is operated at a time, the switch is set to shunt the charger to the proper cupola in the morning and it is not necessary to change the position of the switch during the day. The bucket is lowered in the cupola to a point a short distance above the material which already has been placed and is dumped. Of course, as soon as the charge in the cupola reaches the level of the charging floor and the blast is put on, it is not necessary to lower the bucket in the cupola to dump the charge.

Design of the charging bucket permits a straight drop of the materials into the cupola when the bottom is released. A partition is riveted into the middle of the bucket so that the swinging doors, after being released, form a continuation of the partition plate and allow the materials to drop straight into the cupola. After the charge has been dropped into the cupola, the charging crane is moved out a short distance and the door at the bottom of the bucket closed by lowering the bucket upon the floor. As the bucket comes to rest on the floor the swinging doors are closed and latched automatically.

Returns Bucket To Car

The charging crane then raises the bucket and returns it to the scale car, where the second bucket, which has been filled by the operators in the storage house, is picked up and taken to the cupola.

Since the work in this shop consists of light castings, such as resister grids, parts of electric stoves, etc., the return scrap is exceptionally bulky. For this reason it is necessary to use two buckets for one charge. The first bucket contains the pig iron and a portion of the scrap while the second bucket carries the remainder of the scrap, the coke and limestone.

One charge, as made up in two buckets, weighs 2500 pounds. The charging crane makes one round trip from the charging house to the cupola and return in 3 minutes, thus one complete charge is made every 6 minutes. At this rate, the cupola, which is lined to 54 inches, melts in the neighborhood of 25,000 pounds per hour. The blast is put on at 9:45 a. m. and the bottom is dropped about 4 p. m. Under normal conditions the plant is melting between 110,000 and 120,000 pounds per day.

Three men are required to handle all of the materials from the storage house to the cupola. Two men make up all of the charges in the buckets, while one man operating the crane carries the raw materials to the cupola to be charged. With the system of charging formerly employed, 8 men were necessary to handle the materials. Four men worked in the storage yard preparing the charges. One was required to operate the elevator which carried the materials from the ground floor to the charging platform and 3 men worked on the platform charging the materials.

The Cleveland plant of the Westinghouse company is built on a bluff a short distance from Lake Erie. The light castings shop is situated on the north side of the plant and the door from the charging floor to the storage yard faces the northwest. Designers of the charging system found it necessary to provide some means of preventing the cold winds from off the lake sweeping through the door and throughout the foundry. Of course, it was considered desirable to devise some method which would function automatically. This problem was solved by swinging two doors on double action hinges at the entrance to the charging platform. The doors are held by springs to prevent their being blown open by the wind. The charging crane is surrounded by a steel strip, as may be noted in Fig. 9. The doors are pushed open by this metal strip as the charging crane passes through, and are closed by the springs as soon as the charging crane has passed through, in or out.

Book Review

Metallurgy, by Henry Wysor, cloth, 433 pages, 6 x 9 inches, published by the Chemical Publishing Co., Easton, Pa., and supplied by THE FOUNDRY, Cleveland, for $6, postpaid, and in Europe by Penton Publishing Co. Ltd., Caxton House, London, for 30 shillings, net.

In its third edition, this treatise for students in engineering has been largely rewritten to bring it abreast of later developments of an advancing subject. The author stresses in his preface the importance of a knowledge of metallurgy to all engineering students, as materials of mechanics and construction.

He begins with the winning of metals from the earth and proceeds to a study of their properties as exhibited in manufacturing and testing. Attention is paid to the historical background.

The volume is arranged to concentrate attention on properties and the mechanical and thermal operations by which properties are developed and utilized. Subjects made a part of the work include alloys, casting, metal working, and heat treatment. All metals are included, the rare and noble with those of more utilitarian service. Illustrations and formulas illuminate the text.

A Correction

In the last paragraph, third column, page 436 of the article "Arc Furnace Design Involves Numerous Features," the word *power* should be substituted for the words *current* and *amperage* in the first sentence. Also on page 439, second paragraph, the arc lengths should read 3½-inch and 3-inch instead of three ½-inch and three 1-inch arcs.

Uses Gas To Melt Nickel Alloys

By Justin A. Duncan

Two Gas Fired, Recuperative, Crucible Furnaces Are Used in Melting Nonferrous Metals

MODERN civilization with its fast transportation, rapid communication and mass production continually is demanding metal castings of tougher, noncorrosive alloys. The exacting requirements included in the specifications for these castings have been met but the foundryman has found it difficult at times to melt the metal for the alloy castings without encountering trouble.

A solution for this problem recently was found at the foundry of the William Duncan Co., East Boston, Mass., after considerable research and experimental work. The company was established in 1875 as a brass foundry and now is making commercial castings for high pressure and heavy duty work, such as valves, valve seats, pistons, nozzle blocks for turbines, phosphor bronze bushing stock, bearing metal, journal boxes, steam, water and air regulating devices, and kindred products which are subjected to high temperatures in use.

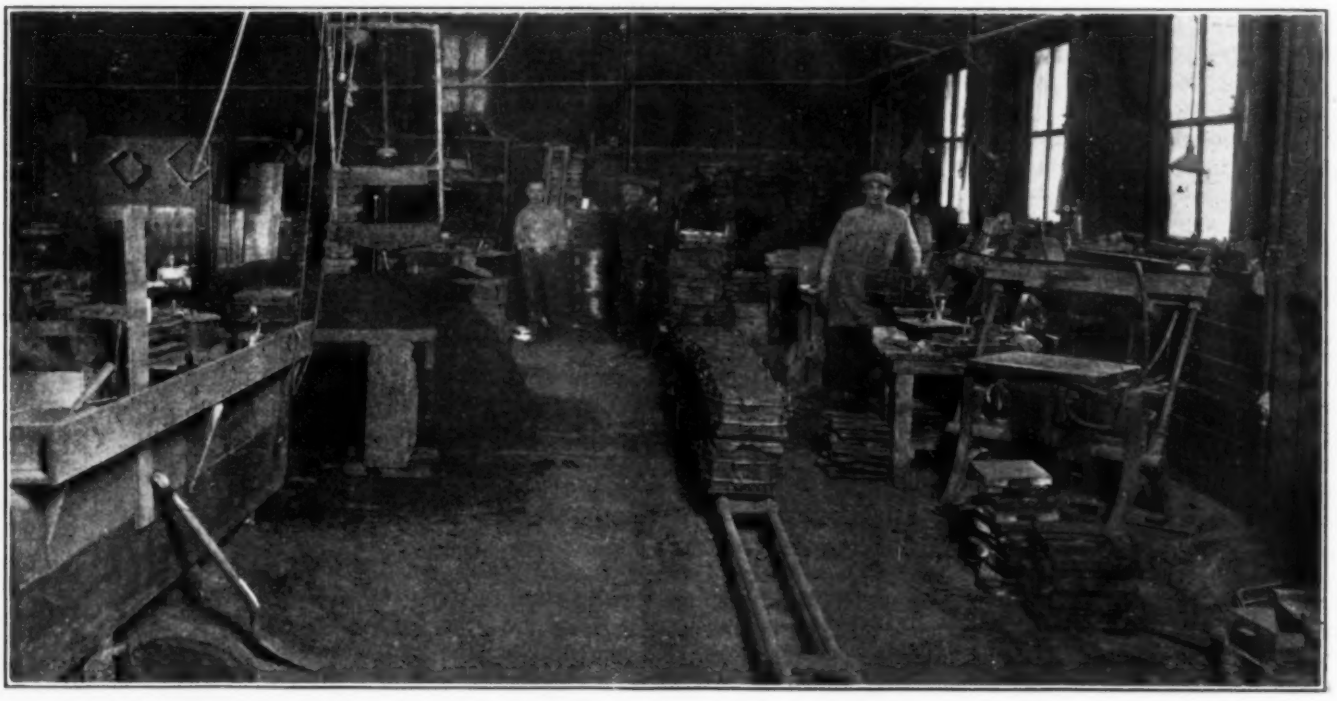
The plant has a capacity of 3 tons of finished work a day. The castings are made of brass, bronze, aluminum, nickel and a special alloy having a high nickel content. This alloy was developed to combine to a high degree the qualities of great strength and resistance to corrosion.

Considerable difficulty formerly was encountered in melting nickel and the special alloy metal since both of the metals must be brought to a temperature of approximately 2800 degrees Fahr. before pouring. If the metal is cast at lower temperatures the losses are heavy. As orders accumulated at the plant it became necessary to install equipment that would supply continuous heat, properly controlled so that metal could be supplied at definite periods, at the correct temperatures and with all elements of chance eliminated.

Gas was tried and found so successful in providing proper melting conditions for the alloy metal that the company installed two gas-fired, recuperative, crucible furnaces manufactured by the Surface Combustion Co., New York. Since the installation of the furnaces, no difficulty has been encountered in melting the alloys and the losses have been reduced greatly.

The use of gas-fired furnaces produced a saving in time, labor and fuel. The time required in melting is reduced considerably, the initial heat now requiring 2½ hours and the subsequent heats 50 minutes. The results obtained in melting the nickel and alloy castings also have been duplicated in melting bronze, brass and other nonferrous alloys.

Gas-fired core ovens also were installed in the foundry. The constant temperature, which is possible with the gas fired equipment, and the ease with which the temperature may be controlled, has been instrumental in eliminating losses to great extent.



ONE CORNER OF THE FOUNDRY WHICH PRODUCES CASTINGS FOR HIGH PRESSURE AND HEAVY DUTY WORK

IRON PREDOMINATES In British Association Discussions

By Vincent Delport

European Manager, THE FOUNDRY

AMERICAN participation in the International committee of foundry associations was officially offered to Paul Ropsy, president of the committee and of the Association Technique de Fonderie de Belgique, who was one of the distinguished guests at the 24th annual convention of the Institute of British Foundrymen in Sheffield. Mr. Ropsy asked V. C. Faulkner, the retiring president of the Institute to announce the event to the meeting. About 300 delegates from all parts of the British Isles, and several foreign members, attended the convention, which lasted from July 5 to July 8. Sheffield is one of the most important iron and steel centers in Great Britain, and is renowned for its special steels and foundry specialties, particularly its heavy castings. The city is the seat of a well known university and also possesses a technical college. Many new steels were developed in the well equipped research departments of such firms as Vickers, Thos. Firth and John Brown, Hadfield, William Jessop, Edgar Allen, Cammell-Laird, and much work has been done in the metallurgical department of the University. Sheffield is the birth-place of manganese steel.

On the evening of Tuesday, July 5, the visitors were officially received by the Master Cutler and Mistress Cutler of Sheffield. The technical sessions took place at the applied science department of the University. The meeting opened with an address of welcome by the Lord Mayor of Sheffield, the vice-chancellor of the university Sir Henry Hadow, the Master Cutler and the president of Sheffield chamber of commerce. The Oliver Stubbs gold medal was presented by the Lord Mayor to Emeritus Professor Thomas Turner, who recently retired from his chair at the University of Birmingham. Another presentation was that of a grandfather clock, which was offered by the Sheffield branch of the Institute to John Shaw who has just retired from his post at the Brightside Foundry & Engineering Co. Ltd., Sheffield.

V. C. Faulkner, the retiring president, thanked the distinguished representatives of the city of Sheffield for their warm welcome. He read messages of greetings received from the American Foundrymen's Association and from the French association, and alluded to the great reception which the European foundrymen enjoyed in America last year on the occasion of the Second International foundry congress. He extended the greetings of the Institute to the foreign visitors who were present at the meeting, and who included Paul Ropsy, Professor Piwowarski of the High Technical school, Aachen, Germany, and Herr Nipper, John A. Penton, chairman of the Penton Publishing Co., Cleveland, T. Earnill, University of Illinois, Urbana, Ill.

JOHN THOMAS GOODWIN

President of the Institute of British Foundrymen and also president of the Sheffield branch of the Institute of Metals is 49 years of age. He was educated in private school at Ockbrook, Derbyshire, and attended the science and art school at Belper. His first connection with the iron business, was with the Butterly Co. He came from a line of ancestry running back to 1778, of whom many were important factors in iron production. Later he served with the Dern & Duff Steel & Iron Co., Barnsley, and finally became junior engineer for the Holwell Iron Co. Melton Mowbray, Leicester, and became manager of the pipe department upon its establishment by that company. He next was works manager for Cochrane & Co., Middlesborough, where he reconstructed the foundries, and since 1908 he has been manager of the pipe shops, jobbing foundry and machine shops of the Sheepbridge Coal & Iron Co., Sheepbridge, England. Mr. Goodwin was elected vice chairman of the council of the British Cast Iron Research association in 1926 and holds memberships in a number of important technical organizations.

The election of officers and members of the council of the Institute of British Foundrymen then proceeded. J. T. Goodwin, Sheepbridge Coal and Iron Co., near Chesterfield, was elected president. S. H. Russell, of Leicester, was elected senior vice-president and Wesley Lambert, J. Stone and Company, Ltd., Deptford, London, junior vice-president. Five members were elected to the council. These included: W. T. Evans, of the East Midlands, A. Firth of Sheffield, J. Haigh of the Lancashire, A. Harley of the Birmingham and H. Winterton of the Scottish branch. On the evening of Wednesday, July 6, the annual dinner took place, at which John A. Penton answered the toast of "Our Guests." An excursion in the picturesque surroundings of Sheffield was organized in the afternoon of Friday, July 8.

In his presidential address, Mr. Goodwin reviewed the organization, and emphasized the value of the work carried on by the British Cast Iron Research association, which can be considered as an offshoot of the Institute. The speaker also laid stress on the importance of educational work in the foundry industry and said that the Institute should do everything in its power to encourage the formation of young foundrymen, and that sanitation, safety and all material improvements should be made to attract the younger workmen. The president ended by emphasizing the part played by the Institute in the development of international relations. He said that he was glad to see that the Institute was exerting an ever stronger influence on foundry matters throughout the world, and that the membership had increased from 1574 on April 30, 1926 to 1636 on April 30, 1927.

The first paper on the program of the technical sessions was the exchange paper presented by the Ameri-

can Foundrymen's association, on the properties of coke affecting the cupola melting of steel, by James T. MacKenzie, chief chemist, American Cast Iron Pipe Co., Birmingham, Ala. In the absence of Mr. MacKenzie, the paper was presented by J. E. Fletcher, of the British Cast Iron Research association, Birmingham, England. This paper was discussed jointly with the one presented by P. H. Wilson, Stanton Ironworks Company, Ltd. on the importance of air control in efficient cupola practice. The discussion was opened by John Shaw, who took up first Mr. MacKenzie's paper and emphasized the fact that iron suitable for ¼-inch diameter test bars is most unsuitable for thin or thick castings. He laid stress on the importance of the coke ratio and of the purity of the coke, and its carbon contents, saying that he used as a coke ratio 1 to 7½ with 88 per cent carbon coke and obtained cast iron with 2.3 per cent carbon.

In the conclusions one could obtain from the paper, Mr. Shaw said that there were great variations in the table given by the author, which were difficult to understand. He confirmed the importance of the size of coke, relating his experience with large sized coke which he obtained from Westphalia during the British coal strike.

Dealing with Mr. Wilson's paper, Mr. Shaw pointed out that in the series of tests made by the author to plot his curves, the first casting normally would be made in a cold chill, and that the mold would get warmer in the next operations.

F. J. Cook, of Birmingham, member of the council, referring to Mr. Wilson's contribution, said that the measure of compressed air necessitates mathematical calculations. It is the oxygen brought by the air that is active. Since the amount of oxygen in every foot of air changes continually, Mr. Cook would prefer that air should be measured in weight. The speaker has seen differences of volume amounting to 19 per cent.

Professor Campion, Glasgow, said that the value of Mr. MacKenzie's paper was minimized by the high coke ratio. Alluding to Mr. Wilson's paper, he said that air should be measured by ton of coke and not by ton of metal. He emphasized the importance of the degree of humidity in the air. A delegate expressed his disappointment that Mr. MacKenzie had not given the volume of blast in the table shown in his paper. He pointed out that studies have been made in Germany on the effect of coke structure and the skin of the coke. A certain coke obtained by the low carbonization process had a hard structure and good combustibility, but was not suitable for cupola practice. Another speaker, referring to Mr. Wilson's paper, said that foundry conditions not always favor the use of delicate instruments.

V. C. Faulkner, speaking for Professor Piwowarski, said that the professor had plotted diagrams showing that the temperature rises in a straight line between 5000 and 20,000 cubic feet of air per minute, and the tensile strength increases. Mr. Fletcher commended Mr. MacKenzie for bringing to the front the importance of the quality of the coke, and added that the melting of all steel charges is little known. Referring to the second paper, he said that the work of the author related to one class of metal being melted under favorable circumstances. However, the paper is of value because it shows an example of good practice. A written statement received from H. J. Young, Central building, London, was to the effect that delicate instruments cannot be used practically in the foundry, and that a home-made pressure gage is the best.

The next paper by Professor Desch, University of Sheffield, was entitled "Stresses in Nonferrous Castings." Wesley Lambert noted a passage in the paper where it is said that crystal grains in large marine propellers occasionally cause these to be brittle. Mr. Lambert explained that the crystal grain observed by Professor Desch, and which he had himself sent to the professor did not come from a propeller casting, but from an ingot that had accidentally been in a furnace over a week-end. It is impossible to find large crystal grains in heavy propeller castings, since grains cannot be grown without considerable chill. A. Logan, R. & W. Hawthorn, Leslie & Cy., Ltd., pointed out several cases in his experience where expansion had been heavy.

This concluded the morning session and in the afternoon visits were organized to Edgar Allen & Co. Ltd., Cammell, Laird & Co., Ltd., Newton, Chambers & Co., Ltd., where centrifugal castings are made by the Hurst process, and Vickers, Ltd.

The first paper read on the next day was that presented by the Association Technique de Fonderie de Paris. The author was L. Audo, works director of the Paris-Orléans railroad company who contributed a note on the manufacture of steam cylinders for locomotives and piston rings. The paper was summarized by A. S. Beach, of London and John Shaw opened the discussion by stating certain objections to the Fremont test. F. J. Cook said that the measure of the wearability does not agree with that of the hardness. Instead of soft rings in hard cylinders he recommends using the same metal in both, a metal giving quickly a high degree of polish. J. G. Pearce, director of the British Cast Iron Research association, said that the formula giving the relation between the Brinell hardness and the tensile strength is not reliable. Mr. Goodwin remarked that a special case should be made for centrifugal castings, which have a great future and that a great deal of research must still be made in this direction. Professor Turner suggested that certain irons are good in certain cases of friction, while others behave better in different conditions.

The next two papers were discussed jointly. One was on the effect of nickel

S. H. RUSSELL

Who has been elected senior vice-president of the Institute of British Foundrymen, was born Aug. 20, 1886. He was educated at the Wyggeston Grammar school and also devoted one year to a metallurgical course of Birmingham university under Prof. T. Turner. Mr. Russell entered his father's works as an ordinary apprentice at 16 years of age and worked four years as a coremaker and molder and then one year at Birmingham university. In 1910 he took over the supervision of the foundry under his uncle, who died in 1916, and since 1916 he has been a partner in the firm founded by his grandfather in 1864. He personally supervises all the foundry work. Mr. Russell has served on the council of the British Cast Iron Research association since 1923. He also is a member of the research and publication committees. He was president of the East Midlands branch of the Institute of British Foundrymen in 1923-24 and 1924-25. Mr. Russell attended the International Foundry congress in Detroit as a representative of the I. B. F.

and chromium on the strength properties of gray cast iron, presented by Professor Piwowarski on behalf of the German association of foundrymen, the other was the strength of cast iron, by J. E. Fletcher. T. H. Turner, of Birmingham, in opening the discussion said that we are entering the alloy, cast-iron age, when irons giving 100,000 pounds per square inch, with good machinability, strength and non-corrosive qualities can be obtained. Nickel and silicon act in the same direction and give graphite, but nickel gives it in a much finer state. The addition of nickel will be successful only by dropping silicon. Dr. Longmuir, Sheffield, laid stress on the fact that crucible melted iron should not be confused with cupola melted iron. A great vista is opened by the application of heat treatment after casting.

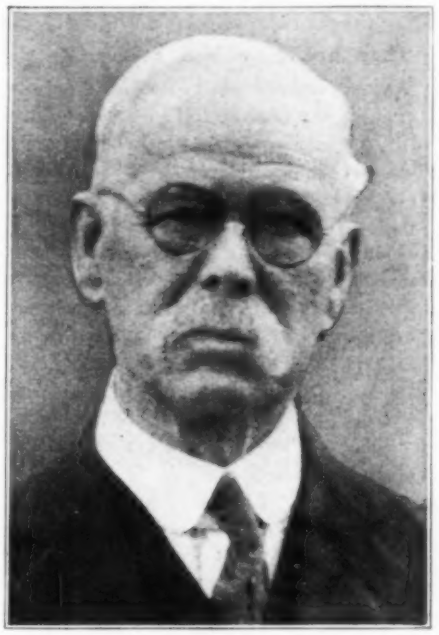
John Shaw, referring to Mr. Flecher's paper said that the rate of cooling has a great influence on the strength of cast iron. With regard to nickel and cast iron, he said that he has obtained good results with a double heat treatment over 950 degrees, the Brinell number went up considerably. He said that it is doubtful whether such results can be obtained from the cupola.

J. G. Pearce mentioned that the addition of 1 or 2 per cent of nickel and chromium in white-heart, malleable iron gave a tensile strength reaching 90,000 pounds per square inch. He

(*Concluded on page* 620)

Nestor of New England Foundrymen Dead

JAMES F. LANIGAN, oldest and probably best known active foundryman in New England where he operated the Davis Foundry, Lawrence, Mass., first as superintendent and later as owner for a period of approximately 60 years; died at his home 239 Andover street in that city on Thursday morning July 14 at the hale old age of 84. His final illness and practically the only illness from which he ever suffered in a busy life that exceeded by a comfortable margin of 14 years the biblical span of three score and ten, lasted only 10 days. Tall, broad and upright he retained his vigor to a remarkable degree. The thinning white hair in a measure served to indicate the passage of the marching years and the heavy white moustache linked the wearer with a generation long past, but his outlook on life and his interest in current affairs were just as bright and keen at 84 as they were at 21.



JAMES F. LANIGAN

The late Mr. Lanigan was born Dec. 8, 1843, in Killkenny, Ireland, but at the age of 6 months he was taken to America by his parents who settled in Lawrence. With the exception of a few months as a young journeyman molder, spent in the foundry of the Fitchburg Machine Tool Co., Fitchburg, Mass., he lived his entire life in Lawrence. What seems more remarkable, taking into account his nationality and the trade he learned, he remained all these years in the same foundry. Not the same building of course. It was enlarged and extended several times and in comparatively recent years was replaced by a large, modern brick plant equipped with the latest mechanical and labor saving devices.

In addition to being his business, the foundry was his pet, his hobby, in which he maintained the keenest interest until the last. Comparatively early in life he had amassed a competence on which he might have retired and lived an inactive existence. Such a course presented no appeal to a man with a strong, active body and if possible a still more active and vigorous mind. He was a master foundryman of the old school skilled in every detail of practical operation and equally skilled in every feature of management.

He served an apprenticeship in the old Davis foundry in Lawrence and the thorough manner in which he mastered the details of the trade is indicated by the fact that at 21 he was appointed foreman of the foundry. For many years he was known as the *boy foreman*, but that did not prevent him from maintaining dicipline and getting a day's work out of the rough and ready, and frequently boisterous element that formed the larger part of a foundry crew in those days.

Imposing presence, great physical strength and agility, coupled with a nimble wit and a ready tongue commanded respect and successfully carried him through many a trying episode in his earlier years. In 1893 he acquired sole ownership of the business and continued to operate it under the old name, the Davis foundry, until the time of his death.

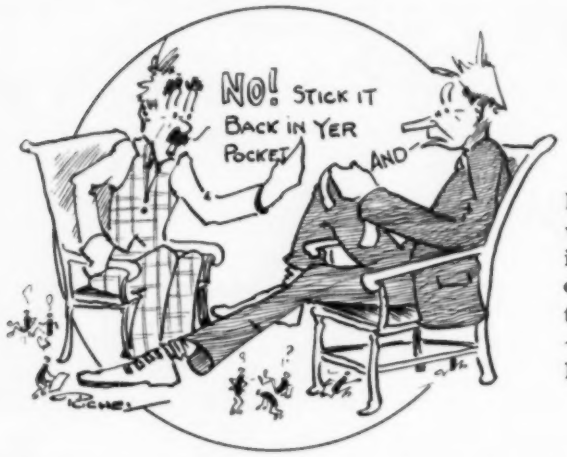
He was a charter member of the New England foundrymen's association and was one of the men who met in Philadelphia in May 1896 and organized the American Foundrymen's association. He served as president of the New England Foundrymen's association for one term and was a district vice president of the American Foundrymen's association for the year 1902. The recent convention of the American Foundrymen's association in Chicago was the first convention of the association he missed since its organization.

He was an active participant in all discussions both at meetings of the New England and the American Foundrymen's association and thousands of foundrymen of the old and new generation retain pleasant and kindly recollection of his shrewd, humorous and sometimes caustic comment; comment that lost nothing of its attractiveness through a tinge of brogue that had survived through so many years absence from the land of his birth.

In 1902 Mr. Lanigan acquired the plant of the Emerson Manufacturing Co., and seven years later he bought the Lawrence Manufacturing Co. The first was devoted to the manufacture of paper mill machinery and the second to the manufacture of pumps. Two sons and one daughter survive.

Bill Finds a Wonderful Story in the Newspaper

By Pat Dwyer



LISTEN my lad" said Bill the other night while he gracefully draped himself over two chairs on the veranda and pulled a handful of newspaper clippings out of his pocket, "Listen me boy while I read you a real foundry story I had the good fortune to find in a paper today."

"You can stick the story back in your pocket" I told him. "I have heard and read millions of 'em and even have tried my hand at writing a few now and again. They are all alike. The vein has been worked out."

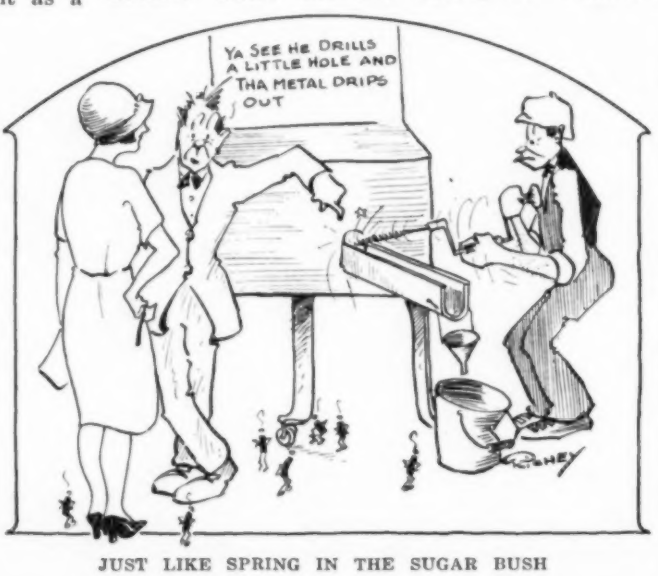
"That's the narrow professional viewpoint" said Bill. "The stories with which you are familiar have been written by men on the inside and naturally they present a certain sameness. This one was written by an outsider, an out and out, outsider and illustrates Burns' famous lines, *'Oh! wad some power the gifties gie us to see oursel's as ithers see us!'* This story was written by a beautiful young lady, a student in a school of journalism who was given an assignment to describe a manufacturing plant as a test of her qualifications to enter the noble field of journalism.

"The principal essentials to success in this field are an observing eye and ear, a nice sense of perspective, a wide background of general knowledge and a photographic memory to receive and retain a mental impression of all that is said, done and presented at any given time or place, or under any set of circumstances. With true feminine inconsistency the young lady ignored all the beacon lights, all the traffic signals and road maps and just followed her own sweet fancy in writing the story. Accuracy in describing the plant, the equipment, the personnel, the methods or the product —what are these trifles?

Like the dew on the mountain,
Like the foam on the river,
Like the bubble on the fountain,
They are gone and forever!

Any person can describe these things. Your true artist is not troubled with prosaic details. He or she gives you personal impressions and that is a highly important feature. If the finished job is over your head, if it resembles nothing in the heavens above, the earth beneath, or the waters under the earth, why, that is your misfortune. It just proves how dumb you are. This author was a real artist, as I said in the first place. Listen my son and you shall learn what a foundry looks like from stem to stern. You'll be surprised!"

"All right" I said. "Have it your own way. I only shall stipulate one thing and that is if the thing is written in verse, any kind of verse, blank verse I shall not be responsible for what may happen to you. I am a patient and long suffering individual but I must draw the line some place, and if there is one place more than another where the line should be drawn it is in the field of amateur poetry. Go ahead. Shoot!"



JUST LIKE SPRING IN THE SUGAR BUSH

WRITER VIEWS MOUNTAINS OF IRON

By Lorena Lovelace

I have just completed the grand tour. And sore footed and pop eyed and heavy headed, I have staggered to the typewriter to inscribe in letters of black the one word—GIGANTIC.

Now, Marvin Button who conducted me on the grand tour, says he is SO tired of hearing people use the word "gigantic" that he could sit in his little cubby hole and TEAR his hair and weep; but I feel that the person who has completed the grand tour without a nervous breakdown should have the privilege of using the word she pleases in describing it—and using that word as many times as she PLEASES. And GIGANTIC is MY word.

The grand tour is not a trip to Europe, as the UNSOPHISTICATED might think; but a tour over the Apahauki Iron Works which covers seven or more—and I believe more—acres of Dill county land. After touring it for the better part of a day, I feel no need of a summer vacation; only the need of a HOSPITAL where I might have complete QUIET and absolute REST for a couple of months. And I feel NO need of summer scenery. Heavens NO! I have seen streams of flaming gold; cataracts of molten lead; mountains of scrap iron; and fields of waving CRANES and iron rails and BOILERS and whiteway POSTS.

"Did you get that field of waving cranes?" said Bill. "That's the real artistic touch, the pure quill. I wonder what it means?"

My tour of the iron works began at the office of the main building and right there I was impressed with the MAMMOTHNESS—if there is such a word and if there is not there ought to be just for this iron works. For as I entered I was faced with a telephone operator with a complete SET of telephones and wires of her VERY own to operate. And up to that time I didn't know anybody in the place had a private telephone system except the honorable city of Apahauki. Mr. Button later told me several local factories had PRIVATE systems, but I have never SEEN them so they won't interfere with this story.

From the main building we set out on our long jour-

ney, stopping here and there to look at all sorts of machinery I never was able to recognize in spite of the explanations of Mr. Button. In fact a few little pieces of machinery that I almost grasped before Mr. Button began speaking, became so wonderful and complicated as he talked about them that they became unrecognizable immediately.

"Kind of a now you see it and now you don't" said Bill.

"Just so" I remarked. "Proceed."

We went first to the..... My stars, I don't know what was the name of the first department. Here through a glorious shower of sparks, a liquid stream of fire poured from a gigantic boiler into a bucket. The boiler, as my guide explained was a cupalo, but I can scarcely believe it, for I thought cupalos were little towers that sat on top of HOUSES. And this was a big black stack with a trough coming out of the bottom of it.

"One strike," said Bill.

I didn't let the cupalo worry me though, but gazed transfixed at the streak of running fire pouring into the BUCKET. Melted IRON it was. And as fast as a bucket filled, two men removed it, carrying it on a long POLE to pour it into one of the dozens of molds lying upon the ground waiting to be filled.

The day I made the tour the molds were turning out manhole tops, our manhole tops, but I would never have known it from looking at the molds which reminded me of old stacks of some description filled with sand. There were big holes in the sand for the melted iron to go IN, and then there were little holes for the melted iron to GET AIR after it got in.

"Strike two!" said Bill.

In one end of the building a half dozen or more men were working on a tremendous SOMETHING which caught my eye.

'I believe that is a still they are making,' said Mr. Button.

And then frightened or something by my look of interest he added quickly, 'a turpentine still.'

I insisted on drawing nearer to see exactly how this still was made, and after looking at it for a good half hour and getting Mr. Button and several of the workmen to explain it to me in detail, I gathered that it was a heap of work. I am quick to catch on to things like that.

"Three strikes!" said Bill. "The player's out!"

"Is that the end of the story?" I inquired hopefully.

"No," said Bill. "Just the end of the first inning."

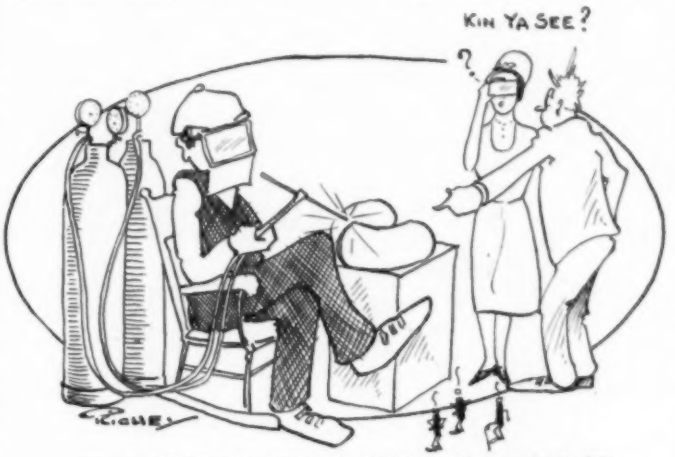
From this department we went to the department of - - -. It seems that the name of that department has skipped me right now, but I might think of it later. Anyway here were millions and millions of big and little contrivances which Mr. Button explained were patterns from which workmen made the wheels and BOILERS and gears and all the other things that had to be made. There were three full stories of these patterns.

And Mr. Button went around picking them up lovingly and announcing, 'This is a pattern for - - -'

But I've forgotten EXACTLY what he said it was a pattern for. Just every thing though. I got the idea that the Apahauki Iron Works could make EVERYTHING that has ever been heard of, and perhaps some things that haven't been heard of.

'If you Haven't a pattern, what do you do,' I asked.

And straightway I realized I had asked the WRONG thing, for then



WELL MEANT EFFORT TO BRIGHTEN THE CORNER

Mr. Button insisted on carrying me to a part of the plant he had ALMOST skipped over. It was a large room where several men were making patterns. They were making them from CHARTS which looked so horribly COMPLICATED I just gave them one peep and hurried on. I know when things are OVER my head.

'That is worse than cutting out a dress from a pattern,' said I.

'Oh! no,' said the old man, very politely. 'A dress pattern is MUCH more complicated than one of THESE charts.'

Then after the patterns I saw the noisy and GIGANTIC machinery that generates the electric power for the foundry; and I caught faintly Mr. Button saying something about RELIEF and COMPRESS or maybe it was COMPACTS, but I just overlooked SUCH remarks.

In the next tremendous BARN there was a man doing something with a very bright TORCH and Mr. Button rushed about and got me some glasses and I put them on, but I NEVER did know what I was supposed to LOOK at. He was a nice-looking man, though, so after looking at him for about 15 minutes I said, 'Very nice.' and gave the glasses back and we moved on to where another man was working with a torch and this time Mr. Button gave me a regular mask with a slit of colored glass in it and I looked at this man for many minutes. He was working on a boiler as long as Main Street, or so it seemed to me, and just as I decided he was boring some holes in it with his hot TORCH, Mr. Button spoke. He might just as well have said nothing. I could SEE his lips moving but only caught a WORD now and again.

'He is cementing that TUBE together,' he 'lowed. 'That, you know, is an electric welding torch.'

He yelled some more information, but the noise was so TERRIFIC it was swallowed up in the din. Some sort of machine was making enough RACKET to be an entire battle front. I just thought if the theater people could borrow that contraption when the Birth of a Nation or the Big Parade came to town, they could do away with the ORCHESTRA entirely. Never have I HEARD such a rat-tat--tat and a rat-tat-tat. This machine, it seemed, was PUNCHING holes in some iron about five-eighths of an inch thick. Of course it was SOME accomplishment, but if I had been the machine, I wouldn't have made quite so much of a FUSS about it.

Now that I come to think of it, since my head has stopped HURTING so fiercely, it wasn't the machine that was punching the holes that was making all the fuss after all.

"Now that is what I call real handsome," said Bill. "Some people would ignore a mistake or attempt to cover it up. Not this gallant little reporter. She admits she is human like the rest of us and like the rest of us she occasionally makes a mistake. Shall we accept her apology in the same free and open-handed manner in which it is tendered?"

"To tell you the truth," I said, "she saw so many curious sights on the grand tour that I felt no surprise when she referred to the rat-tat-tat of the punch. No living person, so far as I know, ever heard a punch behaving in that manner, but then for that matter who ever saw fields of waving cranes or saw two men with a pole carrying a bucket of molten iron? Nothing surprises me any more. I suppose the first lad she saw with a riveting gun reminded her of a red-headed woodpecker on a telegraph pole."

"No," said Bill. "That comparison is too obvious. Too amateurish. It would introduce a false note, a discord in the otherwise perfect symphony of harmonious composition she had built up. It would break the mystical continuity of the vision in which she floated for a few hours on this memorable occasion. Let's see, where did I leave off? Oh! yes. Here y'are. She takes a fresh grip on her gum, shoves a new sheet of paper in the typewriter and with accelerated tempo dashes into the concluding stanza."

"Whistle the remainder of it," I said. "Perhaps it will sound better. You may omit the grace notes."

"You're just jealous," said Bill. "Here's this charming young damsel sees a foundry for the first time in her life and writes a master piece. You have spent the greater part of your life in a foundry and yet to save your soul you could not sit down and write a story like that."

"No," I admitted quite truthfully. "You are right. I couldn't."

"I would give you the story to keep," said Bill, "but it is the only copy I have and I want it for myself. I never saw anything like it."

"Same here," I said. "What are you going to do with it?"

"Well," said Bill, "I'll tell you. I think I'll get one of the lads in the pattern shop to make me a nice little board about 10 x 12 inches with a prop at the back to hold it up. Then I'll paste these newspaper strips on the board and set the job on my desk for the benefit of visitors."

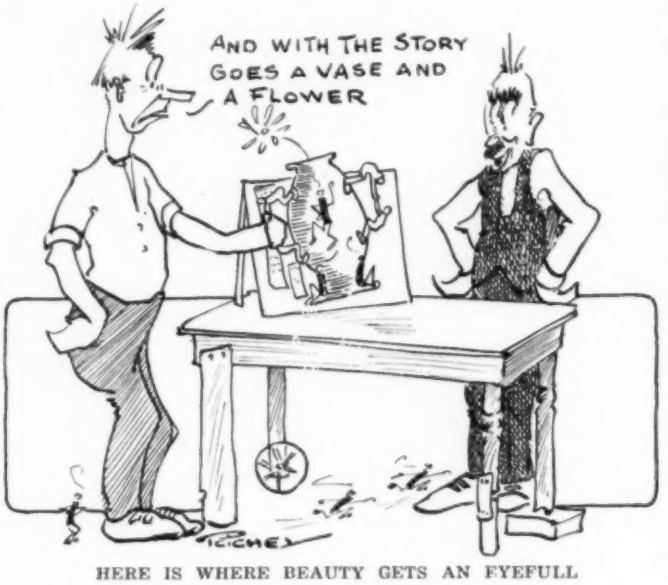
"Isn't that thought just too beautiful for words," I said. "You can place a tall, slender vase slightly to one side with a single, fragrant rosebud in all its virgin beauty coyly peeping over the top. The exhibit will present such a charming contrast to the litter of papers, blueprints, cigaret butts, broken castings, old cores, patterns and the layer of dust which covers the desk with the exception of a small cleared space in the center near one side where you park your feet."

"Perhaps I'll hang it up on the wall," said Bill. "Anyway, that will be an after consideration. I'll find a place for it. However, in the mean time I wish you would keep still. I have not finished reading the story and some of the best stuff is near the end. Listen.

- - - it was not the machine that was punching the holes that was making all the fuss after all. It was some sort of contraption that resembled a shooter for skeeting mosquito devilment which a man was using on a vessel that looked like a small BATH tub. I believe Mr. Button said the man was riveting a rim on it or else was RIMMING a rivet on it. I don't think it makes any PARTICULAR difference which he said, as they both MEANT the same to me.

About this time I caught sight of a TREMENDOUS thing, which was their water tank upside down and that it held 75,000 gallons of water when in its natural position. I was RELIEVED to hear it for I was much perplexed as to who could use an iron globe almost as big as the WORLD itself.

Being somewhat dazed by this time I suggested bringing the grand TOUR to a close, but there was such a HURT look on Mr. Button's face at such a callous remark I was sorry I suggested it. After watching another gigantic machine cut sheets of iron five-eighths of an inch thick with as much ease as my trusty and rusty scissors cuts out paper dolls, I limped on back toward headquarters.



HERE IS WHERE BEAUTY GETS AN EYEFULL

Just before reaching the office, though, we detoured to stop a few minutes in the shipping room and there I weighed and discovered I had lost TEN KILOMETERS on the grand tour. There is nothing like HARD traveling to reduce one.

"Ten kilometers is quite a loss," said Bill.

"It sure is," I agreed. "Approximately 6¼ miles. Off hand I should say that constitutes a record even in these modern days when the art of reducing has been developed to a high state of perfection. Read the remainder of the story. Did the author survive?"

"Survive?" said Bill. "You don't know the half of it, dearie."

And I stood in the shed congratulating myself on my FINE loss my eye caught sight of iron being shipped to Pernambuco. Now isn't that in Argentina or is it Australia? I have always been good at machinery but never much at geography. Anyway, I know it was going a long ways which was the last point I need to PROVE to me that beyond a doubt the Apahauki Iron Works is a GIGANTIC factory.

"It has been regularly moved and seconded," said Bill, "that this report be received and laid upon the table. Do I hear any discussion before putting the motion before the house?"

"Not from me," I said. "Seems to me our friend Shakespeare said all there was to be said when he referred to gilding refined gold and painting the lily. However, the story reminds me of something I heard a speaker say the other day in discussing the United States as a melting pot. He said conditions here are different from those in the British Isles. Over there they only have four races: English, Irish, Scottish and Welsh. The Scotchman who invented daylight saving, and all other kinds of saving; the Welshman who prays on his knees and upon every other person; the Irishman who does not know what he is fighting for, but who is willing to die for the cause and the Englishman who boasts that he is a self-made man and who worships his Creator. To this list should be added the rising young journalist who writes weird descriptions of things about which he knows nothing."

"The motion is carried unanimously," said Bill. "The meeting stands adjourned."

Book Review

The Iron Industry in Prosperity and Depression, by Homer B. Vanderblue and William L. Crum, 193 pages, cloth, published by the A. W. Shaw Co., New York, and supplied by THE FOUNDRY, Cleveland, for $7.50 and in London, Caxon House, Westminster, for 37s 6d.

Business forecasts evidently are finding greater application in assisting business men to anticipate fairly accurately future market trends. Since practically every industry is dependent upon some branch of the iron and steel industry for raw materials and plant equipment, prices and production of iron and steel respond quickly to any changes in the general business situation. For that reason, the history of business cycles in the iron and steel industry parallels closely the history of business generally.

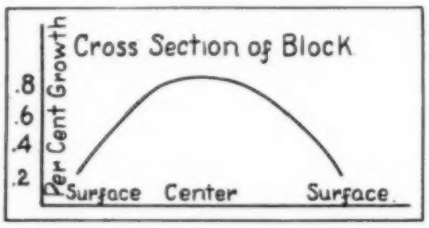
The authors present in an interesting manner the results of a series of investigations of trends in the iron and steel industry. The investigations are designed to apply to that industry certain statistical methods for analysis of recorded data. The study also was undertaken with the aim of developing a method of forecasting conditions in the iron and

steel industry. Data pertaining to the iron and steel industry extend over a long period and are available for such an investigation. While the volume does not cover all of the available material on the industry, the authors have given a sufficiently broad view of the problem to be of great help, not only in analyzing conditions in the specific industry, but in pointing the way for similar analyses of business cycles in other industries.

Examine Causes of Cast Iron Growth

GROWTH of gray iron always has bothered manufacturers and users of machinery subjected to elevated temperatures or intermittent heating and cooling. This growth is of vital importance in steam turbine castings since the use of highly superheated steam has become more general in recent years.

Investigations on the growth of gray, cast iron almost entirely have been carried out at temperatures above the lower critical temperature in the iron-carbon diagram, 730 degrees Cent. Temperatures at which castings are heated in practice generally are below this, and as might be expected, the growth to a certain extent is governed by the state of the cast iron. Therefore, it was desirable to investigate the growth at temperatures below the critical.



CENTER PORTION SHOWS GREATEST GROWTH

A temperature of 600 degrees Cent. was chosen for the experiments carried out by O. Leihener and F. Wust, and recounted in *Forschungsarbeit.* This temperature is considerably higher than temperatures ordinarily met with in service, but since growth is more rapid at higher temperatures, the changes in volume may be determined more exactly and better comparative data may be obtained.

Twenty-seven samples of gray iron of different chemical compositions were tested. Each sample was heated 50 times for 12 hours at 600 degrees Cent., making a total heating time of 600 hours. After each heating period the sample was allowed to cool slowly for 6 to 7 hours. • To prevent oxidation the samples were heated in a mixture of cast iron borings and copper borings.

This proved to be effective since no decrease in total carbon content could be found after the tests were completed. The reason for preventing oxidation was to study the growth under the simplest conditions.

One process taking place in the growth of cast iron is the decomposition of cementite into graphite and ferrite. This decomposition is followed by an increase in volume, and therefore, it was thought possible that growth is caused by this decomposition. The influence of decomposition on the structure was noted microscopically and showed the almost complete transformation of cementite into graphite and ferrite after 28 heating periods.

Table I gives the chemical composition and the growth of the samples after 50 heatings. Evidently no relation can be found between the chemical composition and casting growth. If growth is caused only by change in volume resulting from the decomposition of cementite, it may be calculated. Using the following values of specific gravity; 7.86 for iron; 7.82 for cementite, and 1.8 for graphite, the growth of pure cementite should be 7.33 per cent and the growth of a sample of gray iron should be proportional to its cementite content.

Calculation shows that the actual growth is considerably greater than that computed and furthermore the growth is not completed when all the cementite is decomposed. Therefore, the total growth cannot be caused only by the decomposition of cementite. It was found that samples taken from the center of the block grew considerably more than samples taken at the surface of the same block. This is shown in Table II and the accompanying diagram.

Since the grain structure of the center of a block generally is coarser than the surface, it might be expected that the grain structure has a decided influence on casting growth. Examination of micrographs showed that gray iron having a fine-grained structure with finely divided graphite had the least growth while the maximum growth occurred in coarse grained gray iron containing flaky graphite.

Table I

Chemical Composition and Growth of Bars

No.	T. C.	G. C.	C. C.	Si	Mn	P	S	Per Cent Growth
1	3.90	3.10	0.80	2.20	0.59	0.09	0.030	4.500
2	3.87	3.01	0.86	2.22	0.59	0.09	0.030	4.010
3	3.90	3.25	0.65	1.83	0.62	0.09	0.030	2.850
4	3.73	2.86	0.87	1.85	1.28	0.29	0.030	2.540
5	2.93	2.39	0.54	2.28	0.67	0.23	0.030	1.880
6	2.96	2.30	0.66	2.45	1.15	1.87	0.030	1.780
7	3.70	2.93	0.77	1.85	1.28	0.29	0.030	1.760
8	2.65	2.02	0.63	2.08	0.61	0.30	0.030	1.613
9	3.35	3.17	0.18	2.15	0.62	0.50	0.080	1.590
10	2.93	2.63	0.30	2.28	0.67	0.23	0.030	1.240
11	2.59	1.79	0.80	2.82	1.08	0.11	0.132	1.240
12	3.42	2.41	1.01	1.58	0.73	0.75	0.030	1.000
13	2.75	2.00	0.75	1.78	1.14	0.30	0.100	0.924
14	3.40	2.74	0.66	1.39	0.50	0.23	0.030	0.817
15	2.49	1.70	0.79	2.35	1.11	0.13	0.143	0.800
16	3.46	2.63	0.83	1.36	0.39	0.16	0.030	0.610
17	3.30	2.74	0.56	1.26	0.52	1.82	0.030	0.420
18	3.46	2.67	0.79	1.36	0.39	0.16	0.030	0.400
19	3.50	2.56	0.94	1.23	0.59	0.20	0.153	0.330
20	3.46	2.65	0.81	1.36	0.39	0.16	0.030	0.320
21	3.40	2.65	0.75	1.39	0.50	0.23	0.030	0.283
22	2.76	2.16	0.60	0.95	0.89	0.26	0.100	0.240
23	3.49	2.74	0.75	1.41	0.95	0.21	0.030	0.220
24	3.40	2.67	0.74	1.39	0.50	0.23	0.030	0.160
25	3.40	2.71	0.69	1.20	0.75	0.25	0.100	0.120
26	2.63	1.91	0.72	1.84	1.03	0.30	0.082	0.080
27	2.72	1.90	0.82	1.58	1.42	0.20	0.100	0.056

Table II

Growth Variations

Location of Sample	Growth in Per Cent
Surface	0.159
Between surface and center	0.283
Center	0.817
Surface	0.310
Between surface and center	0.352
Center	0.610
Surface	1.76
Center	2.54

Advocates Synthetic Sand

Malleable Foundry Finds Used Core Sand Excellent Basis for Blended Molding Mixtures — Glycerine Preserves Moisture

By F. C. Scheiber

DURING the past five years more research work has been done on improving molding sand for the foundry than in all past history. Foundrymen are realizing that many difficulties and problems are found in the make up and structure of nature's sands.

Molding sand has been a bugbear, since the first casting was cast in sand. Sand wastes through the indiscriminate additions of new material, were enormous. The molders of the past generation did well; but they had plenty of time to take care of their sand, which was a large part of their job. Production was slow, sand was cheap and they had plenty of time to prepare it. As years advanced, times changed, and production increased. The molder had little time for pondering over sand conditioning, with the result that this conditioning has been given over to other departments.

For years inexperienced labor has been depended on to make and blend raw molding sand into a workable heap for the foundry. Thousands of dollars have been thrown in the scrap heap on account of poor molding sand. Good and intelligent molders and apprentices have been driven from foundries through having to stand the castings losses due to sand conditions. New surface sands full of organic matter cannot be transferred from the sand bank and dumped on molding floors with expectations of making good castings.

It would be suicide to feed unfiltered water to our boilers, and it is the same with molding sand in the foundries. Surface sand from the natural deposits may be likened to unfiltered water, and is not good for foundry use before treatment.

All Needs Treatment

After years of experimenting and many failures, the writer has come to the conclusion that all molding sand should be treated before being used. Molding sand in its natural state is saturated with foreign matter and flame producing elements, which if not removed before molding will cause blows, washes, cracks, rough spots, cuts, scabs, blisters, excess shrinkage and will prevent the free escape of gases.

The greatest waste in a foundry is discarded sand, which after being used once, is thrown out on the dump at a cost of $2 per ton to carry it out of the foundry. Along with it goes iron scrap of good value. The value of this material which now is classed as refuse, can be realized by running it through a reviving system, since used sand is a base, free of all foreign matter. The product will be, if treated rightly, a better sand for all classes of molding than when it was in the green state. Some foundries make a practice of putting this sand back in the sand heap without cleaning. This should not be done as the silt in it causes the sand pile to decrease in permeability. Lack of permeability in the sand causes an increase in defective castings.

This article was abstracted from a paper prepared by F. C. Scheiber, superintendent, malleable and alloy foundries of the General Electric Co., Erie, Pa., and read at the Chicago convention of the American Foundrymen's association.

Take the burnt out molding sand which clings to the hot castings on the shake out and the used core butts and old cores which are hooked out of the sand after pouring and run this material through a cleaning process. Is it possible to get any better sand as a base than old core sand with its perfect round grains which prevent interlocking when rammed in the mold, thereby guaranteeing a free vent for the escape of gases? Is there a cleaner sand for molding purposes than this sand high in silica content?

This sand formerly was thrown on the dump. Take this valuable sand after cleaning and blend it with discarded molding sand and make any kind of a new molding sand needed for medium, light or heavy work. It will be a sand a molder can depend on. It also will be one which will cut foundry defectives to the minimum.

For the past 2½ years the writer has been using nothing but prepared sand in the malleable foundry at Erie, Pa., and the results have proved entirely satisfactory. Losses have decreased beyond expectation. The molders are pleased with the conditions and when molders are pleased, it is half of the battle. The appearance and surface of castings have improved and molding conditions in general are improved.

Treating Core Sands

Treating core sand for molding purposes is simple provided the sand is prepared for such treatment. The sand used should be of uniform grain size, round and of good sound structure such as Ottawa or Michigan drift sands. The sand can be used first for cores and after casting, all core butts, scrap cores, coreroom sweepings and discarded sand should be run through a barrel type furnace with heat high enough to burn out all core binder and water crystals on the surface of each grain to make the surface clean and rough to hold the clay bath. The heat should be high enough to break down all cores without a grinding operation, as grinding destroys the round sand grains and makes sharp grains which are a detriment to a good molding sand.

All sand should be screened in the dry state and the scrap removed, and all excess dust and silt should be eliminated by air separation before mixing. Many molding sand troubles are avoided.

A mixing machine of large capacity should be used to mix the molding sand. This will give the required blending, or, in other words, distribute the clay evenly around each grain of sand without breaking up the sand grain structures.

The proper clay to use for the bonding purposes in molding sands is a problem and should be given much thought and study, for on the clay hinges the success of this process. First, a clay with high heat resisting qualities and containing over 60 per cent of colloids should be used. Good molding sands depend not only upon the colloidal content of the clay, but on the extent to which this content

is held under various conditions of heat.

The clays used should be pulverized to a fineness of 40-mesh or better, and made into an emulsion bath. This bath should be worked in such a manner that the disruption and dispersion are so complete that all are changed into a colloidal mist.

Dry clay never should be added to the sand heap. It is impossible to distribute it evenly over the pile and coat each grain of sand with the desired amount of clay without forming clay balls and clay pockets which are detrimental to good foundry practice.

Glycerine Prevents Drying

For a long time the writer has had difficulty due to the sand drying out too quickly both in the pile and in the molds. This was found to be true in large molds where the drag and cope were exposed a long time before closing, and the molder had trouble in slicking and patching on account of this dryness. This difficulty was corrected by the use of a small amount of glycerine in the emulsion bath. This will keep the sand moist for hours or days, according to the amount of glycerine used.

Great care should be used in the mixing process. The material should only be milled long enough for complete distribution. Enough coal dust is added to the treated sand to produce a mild smudge when coming in contact with the molten iron. This insures a smooth casting, easily cleaned. A small part of corn flour for green bond then should be placed in the mill and milled for two minutes. Then the clay-glycerine emulsion bath is added to this mixture and again milled for three minutes. This newly prepared sand should be riddled to bring it to a light, fluffy and well aerated condition before beginning the molding operations. This sand should be used in making the entire mold.

Results Satisfactory

Molding sand prepared in this manner is a free venting sand with sufficient outlet for the steam and air generated by the molten iron entering the mold, which guarantees a good sound casting.

It is a great mistake for foundries to use a good facing sand of a fraction of an inch in depth next to the pattern and back this up with old heap sand full of silt and expect a good casting.

A good grade of molding sand made as described may be used for all classes of work. It will produce sound castings with a good surface. The reason for this is that the sand grains are all uniform and can be rammed to the surface of the pattern which produces a smooth surface and clean pattern draw.

To Vary Phosphorus In Steel Tests

The joint committee on investigation of effects of phosphorus and sulphur in steel, which is composed of representatives of the American Foundrymen's association, the American Railway association, the American Society for Testing Materials, the Association of American Steel Manufacturers, the National Research council, Society of Automotive Engineers, Society of Naval Architects and Marine Engineers, Steel Founders' Society of America, United States bureau of standards, Navy department and War department, is planning to undertake a series of tests to determine the influence of phosphorus in steel castings.

The tests will be made on acid open-hearth steel. The tests will be confined to steels having two percentages of carbon, namely 0.25 and 0.45 per cent. All steels tested are to contain approximately 0.70 per cent manganese, 0.35 per cent silicon, and 0.045 per cent sulphur, with no special alloy present. The ranges of phosphorus desired are as follows. Class A (0.25 per cent carbon) 0.025, 0.04, 0.06, 0.07, 0.10 per cent; class B (0.45 per cent carbon) 0.025, 0.05, and 0.07 per cent. No phosphorus will be added in the ladle, but the tests will be confined to steels having residual phosphorus.

For one complete set of specimens for each of three laboratories that will make identical tests, and for sufficient stock for a fourth or reserve set of specimens, 12 bars will be required for each heat treatment, for every chemical composition. The results from three heat treatments will be ascertained. It will be necessary to manufacture 288 cast test bars for making tensile, impact, compression, fatigue and torsion tests, all at room temperature, in three conditions, namely annealed, normalized and normalized and drawn. No tests will be conducted on the steel in the condition as cast.

All heat treating operations will be performed at the bureau of standards where the test specimens will be machined. One set of specimens will be tested at the Watertown arsenal, one at the Naval experiment station, Annapolis, and one at the bureau of standards. The steel will be made in a 10-ton acid open-hearth furnace at the Atlantic Steel Castings Co., Chester, Pa., under the observation of a subcommittee of the joint committee. The bars will be cast according to the methods prescribed by a special committee consisting of a representative of the Atlantic company, W. J. Corbett, Steel Founders Society of America, Pittsburgh, John Howe Hall, Taylor-Wharton Iron & Steel Co., Highbridge, N. J., and R. A. Bull. Electric Steel Founders' Research group, Chicago. Mr. Hall represents the National Research council, Mr. Corbett the Steel Founders' society and Major Bull the American Foundrymen's association.

It is thought the test will cost more than $1500. The Steel Founders' society has contributed $750 and the Electric Steel Founders' Research group $125. The American Foundrymen's association, through its executive-secretary, C. E. Hoyt, Chicago, now is asking for contributions from those steel foundries which are not members of the two groups already contributing.

Nominate 1928 Officers

Nominations for officers of the American Society of Mechanical Engineers for 1928 were announced by the nominating committee at the meeting of the society at White Sulphur Springs, W. Va. May 23 to 25 Nominees are as follows: President Alexander Dow, Detroit Edison Co., Detroit; vice presidents, John H. Lawrence, Thomas E. Murray Inc., New York; Newell Sanders, Newell Sanders Plow Co., Chattanooga, Tenn.; Edward A. Muller, King Machine Tool Co., Cincinnati, and Paul Wright, Paul Wright & Co., Birmingham, Ala.; managers, William A. Hanley, Eli Lilly & Co., Indianapolis; Luther B. McMillan, Johns-Manville Inc., New York, and Fred H. Dorner, Milwaukee.

Delegates to the American Engineering council are: Alexander Dow; D. S. Kimball, Ithaca, N. Y.; R. C. Marshall, Washington; L. P. Alford, New York; H. V. Coes, Chicago; W. S. Lee, Charlotte, N. C.; A. M. Greene Jr., Princeton, N. J.; David W. Brunton, Denver, and John L. Harrington, Kansas City.

To Make Wage Survey

The department of labor soon will begin a survey on the wages and hours of labor in foundries and machine shops. It will cover only foundries doing a heavy class of work and such machine shops that are producing engines, heavier machine tools and general machinery. The survey will cover about 20 per cent of the workers in each state.

Gentlewoman Meets Emergency

Runs Anvil Works

HARRIET FISHER-ANDREW
—retains distaff rights-acquires founder's privileges

HARRIET FISHER-ANDREW, for many years the active—Oh, very active—head of the Fisher & Norris Eagle Anvil Works, Trenton, N. J., has demonstrated that at least one lady is competent boldly to enter the foundry and perform any or all of the duties with neatness, skill and despatch. In a word, to be brief and to compress a great deal of information into the smallest compass, she operated a foundry and made money and that is more than can be said for some foundries operated exclusively by representatives of that branch of the human family which likes to refer to itself in all seriousness as the lords of creation.

Following a railroad accident in 1902, her husband Earl Fisher died and left her heir to a business which had been established by Mr. Fisher's father in 1843 and operated continuously and in succession by father and son. The young and socially prominent widow was faced by a choice of two alternatives. She could dispose of the business and live a life of idle independence, or she could take the reins of government in her own two firm and highly competent hands and guide the business along the tricky commercial highway, notorious for its humps and hazards, its sloughs and washouts and the number of industrial wrecks piled up near every one of its sharp corners.

Many factors influenced her to adopt the second alternative. As titular head of the family she felt a moral obligation to carry on. When a moral obligation is at stake she is that type of person who will carry on in spite of the well known combination in which high water receives honorable mention.

Fearless and adventurous from childhood, the hazard of the game appealed to her. Physical effort promised only healthy diversion to one who reveled in nearly all forms of outdoor sport. An only child, accustomed always to commanding a staff of servants, first in her parents' home and later in her own, she anticipated no particular trouble in having her orders carried out as readily in the shop as in the home. She had to adjust her ideas somewhat in this respect, but after the first flareup which she extinguished as promptly as the job could have been done by the toppiest top sergeant who ever barked an order, she was recognized without outward question or inward misgiving as the boss. A tolerant benevolent boss in many respects, with a friendly interest in the families of her workmen, but a boss nevertheless who reserved to herself the right to dispense the high justice, the middle and the low in all affairs pertaining to the operation of the plant.

Presuming on her youth and inexperience, her first superintendent resented her orders. Playing what he considered a trump card, he threatened to resign. She met him more than half way and fired him on the spot. Also, she said she never would re-employ him. She always keeps her word and that word was given 25 year ago.

When the cupola breast broke out one day and allowed a stream of molten iron to flow over the floor, the shop crew dropped everything in a hurry and raced for the door. She met them and ordered them to their posts. 'Twas neither the time nor the place for pussy-footing or soft and gentle phrases. She boiled down her orders into two or three sentences of vigorous one-syllable English. One man shut off the fan motor, others seized shovels and covered the molten iron on the floor with sand and in a few minutes order was restored. The breast was replaced, incipient fires were quenched and routine melting was resumed.

She familiarized herself with patternmaking, molding and melting practice. She studied metallurgy, markets and management. She attended meetings of the American Foundrymens association, participated in the discussions and on one occasion presented a paper on economical foundry operation including a description of a method for recovering shot iron.

She has sat in her office dictating correspondence and

(*Concluded on Page* 620)

Milestones in Foundry Progress

As Recorded in the August Issue of THE FOUNDRY, Thirty, Twenty and Ten Years Ago

1897

SULZER Brothers foundry at Winterthur, Switzerland, was the subject of an extensive illustrated article, leading the August, 1897, issue of THE FOUNDRY. This shop, a model of compactness and efficiency for its day, was devoted to the manufacture of heavy engine parts, and heavy machinery castings. Henry Gretner was the author of the article.

* * *

The successful operation of a foundry today requires men with greater managerial ability than formerly, and the young man is confronted with greater chances for making a mark in that industry than has at any other time existed.

* * *

This statement of thirty years ago even more is weighted with truth in this era of automobiles, radios and other luxu-veniences.

* * *

The shops that plaster themselves with "no admittance" signs were paid a few graceful compliments by the editor. Only by the interchange of information is progress made possible was the moral deduced.

* * *

Thomas D. West contributed a paper to the Pittsburgh Foundrymen's association on the fusibility of metals.

* * *

Mr. West was one of the earliest and most prolific writers on foundry technical subjects.

* * *

S. S. Knight described the Fletcher method of making cast iron pipe cores, by the use of a paste-like mixture of sawdust, applied to the corebars in place of the hay rope then commonly used.

* * *

The Summit Foundry Co., Geneva, N. Y., was building four new buildings.

* * *

George A. True, engineer of the Whiting Equipment Co., as it then was known, presented an extensive paper on foundry elevators and yard cranes, prepared for the Detroit convention of the American Foundrymen's association.

Faked Foundry Facts

Dumping Them Out

The first man to cast a cylinder block on its side deserves to share a medal with the first human who tried to eat an oyster. Wonder if it was Jos. Wilson?

* * *

Pratt Institute's training course in foundry work was detailed by Prof. W. C. Stimpson. This institution's good service to the industry still continues.

* * *

A combination bull and pouring ladle to hold 10 to 20 tons of steel was described. The bull ladle employed a central, stopper-closed spout and the pouring ladle was supported by hooks, engaging loops on the bottom of the bull ladle. Apparently the idea was to spot the large ladle over a mold, open the stopper and fill the small pouring ladle, and then tilt the latter to fill the mold.

* * *

The rig might be compared in appearance to the kangaroo carrying its young in a pouch.

* * *

No. 2 foundry iron was selling at $22.50, Chicago and $21, Birmingham.

1907

HOW the Ingersoll-Rand Co. introduced an apprentice training system at its plant in Phillipsburg, N. J. is told in the Aug. 1907 issue of THE FOUNDRY. The boys were passed from one department to another, with a sliding scale increase of wages for a four year period.

* * *

John H. Shaw described a permanent mold for casting brake shoes. A coating of graphite and crude oil was applied to the face of the mold every fifth pouring.

* * *

The subject of permanent molds has intrigued the interest of foundrymen since the infancy of the industry.

* * *

Herbert E. Field, now president Wheeling Mold & Foundry Co., Wheeling, W. Va., contributed a paper to the A. F. A. for its Philadelphia meeting, on manganese in cast iron.

* * *

In English foundries automobile engine cylinders are cast with the flange up and a head of metal is provided to wash all dirt to the top of the mold. Care is taken to secure perfectly vented molds and cores.

1917

CASTING chilled iron car wheels at the foundry of the Canadian Pacific Railway Co., Montreal, was the feature story for the August, 1917 issue of THE FOUNDRY.

* * *

The new plant of the Cleveland Cooperative Stove Co., which just had been completed, was described. James Mitchell, then superintendent, still is active head of this shop.

* * *

David McLain, in a communication recommended the use of semisteel cast shell, as a foundry contribution to the war.

* * *

No. 2 foundry iron was selling at $55, Chicago and $47 to $50, Birmingham.

* * *

C. A. Goldsmith, Newark, N. J. was constructing a foundry addition.

* * *

The Lunkenheimer Co., Cincinnati, was building additions to its brass foundry.

The Shakeout

DAN M. AVEY, Editor

PAT DWYER, Engineering Editor
FRANK G. STEINEBACH, Associate Editor

CHARLES VICKERS, Nonferrous Editor
EDWIN BREMER, Associate Editor

¶ Keep Cool With Castings

MANY of the nationally advertised commodities which meet the popular fancy one day and are considered luxuries, become necessities the day after, and call upon the foundries of the country for a large tonnage of castings. The automobile, radio, electric sweeper, electric washer, electric ironer and a hundred others were made possible only through the service of castings. One of the most recent additions to this group that rapidly is approaching the necessity stage, is the electrical refrigerator.

Rapid progress has been made in the perfection of electrical refrigerators during the past five years. Although the principle utilized has been known for a number of years, serious difficulty was encountered in developing a small unit suitable for domestic service. This problem has been solved in the period since 1922 and today practically 100 manufacturers are in the field, although the bulk of the business is secured by about five companies.

IN 1914, only 600 electrical refrigerators were sold. In 1922 sales totaled 10,000 units, but in 1926 the sales increased to 250,000. The first quarter of 1927 showed a substantial increase over the corresponding period a year ago. The greatest market for this household commodity is in the southern states, due partly to the climatic conditions and partly to the intensive sales campaigns which have been carried on by the dealers and public service corporations in that section.

Sales possibilities for electrical refrigerators are enormous. About 15,000,000 homes are wired for electricity and 2,000,000 more are located in the districts now being served by the central stations. With only 500,000 electrical refrigerators in use, it is estimated that from 1,500,000 to 4,500,000 users of electric current now are prospects for electric refrigerators. Undoubtedly this number will increase as the popularity of the product continues to grow.

Although castings are used extensively in the construction of iceless refrigerators, metal parts made by other processes of manufacture are endeavoring to enter the field. Castings have proved their worth in machines in operation today. However, foundrymen cannot rest on their laurels, but must continue to sell the superior quality of castings for use in electrical refrigerators.

¶ The Restless Age

SCRAPPING a plant layout and equipment valued at hundreds of thousands of dollars means nothing to manufacturers of automobiles, driven as they are by the heel-treading urge of competition. Taking a leaf from the book of experience of automotive manufacturers, foundries making cylinder and other motor castings have shown a similar willingness to scrap the present to insure the future. The drive of production quickly shows economy of changes to increase speed and quality of output, and the obsolescence account on many foundry ledgers does regular gymnastics at frequent intervals.

DOES this constant change, this seeming waste of existing equipment, sacrificed in the interest of greater speed, pay in the foundry industry? For answer call the roll of the existing jobbing foundries carrying large automotive accounts. The answer will be found written large in the success of the few. The danger of complacent satisfaction, which will not heed the lesson of new methods, new equipment and progress, is blazoned in red in the list of jobbing shops that have passed out and in the record of foundry departments of automotive shops that find it good economy to buy their castings outside.

THIS willingness to go without question from the known and proved equipment to the new and untried mechanical processes has been a source of endless wonder to foundrymen from abroad. Un-pressed by the burden on increasing labor costs, overseas foundrymen find it difficult to appreciate the necessity, which coupled with desirability induces American castings manufacturers to such great outlay for plant changes. Truly this is an age of mechanicalization.

A LEXICON OF TECHNICAL TERMS

By O. W. Potter

(Continued from Data Sheet No. 678)

Casting Properties

The property of being able to pour (cast) into molds while in the liquid state to form objects of various shapes. All the alloys of the iron carbon series are castable except wrought iron. Some alloy steels were formerly difficult to cast because of the high temperature necessary but the electric furnace now is able to attain the necessary temperature with the desired melting atmosphere.

The higher the melting point of the alloy the more difficult it is to cast readily. The fluidity of the molten metals, their tendency to oxidize and absorb surrounding gases, the rate of cooling, etc. have a decided effect on the ease with which good castings are produced. The order of castability might be put as follows:

1. Gray cast iron (most readily cast)
2. White cast iron
3. Malleable cast iron
4. High carbon steels
5. Low carbon steels
6. Alloy steels

Merit Index (Figure of Merit, Merit Number, Quality Figure)

Merit index is a relative numerical value which is an attempt to measure the commercial value of a material by means of a formula which gives certain relations of important properties.

1. Tieman's Formula—Q=SxD, where:
   Q=Merit index; S=Either tensile strength but preferably elastic limit of any unit; and D=Ductility either elongation for identical and similar specimens.
2. Marre Formula—M=T+E, where:
   M=Merit index; T=Tensile strength in pounds per square inch for specimens of identical or similar shape; and E=Elongation in per cent.
3. McKenna's Formula—M=T (E+20)
   Same as above

(Continued on Data Sheet No. 680)

A LEXICON OF TECHNICAL TERMS

(Continued from Data Sheet No. 679)

Crystallization (Cold Crystallization)

This is a term formerly applied to the process which supposedly led to fracture of parts in motion, such as shafts, connecting rods, axles, etc. This is now definitely disapproved and is no longer in good use. Such fractures occur by *progressive fracture* due to alternate bending stresses.

Temperability

The property of being able to produce varying degrees of hardness by heat treatment. Both the irons and steels are temperable to some degree. The temperability depends principally on the carbon content, also on the other impurity constituents, (Mn, Si, P, and S), ferro alloys, and conditions of treatment. When oil and lead baths are used as quenching mediums. The terms *oil tempering* and *lead tempering* are sometimes used but *oil hardening* and *lead hardening* are to be preferred.

The process of tempering is somewhat erroneously called *letting down, drawing, drawing back, draw-tempering,* and *toughening.* Tempering is always preceded by some hardening process. Tempering in general means some degree of reduction of the severity of the hardening operation for the purpose of removing as much of the brittleness and strain produced as possible with the necessary effect on the hardness, leaving the material relatively hard and tough instead of hard and brittle.

The tempering temperature of steels is ordinarily between about 200-300 degrees Cent. (390-625 degrees Fahr.)

Tempering frequently is thought of as only the drawing back process when in reality it includes the hardening process.

Weldability

The property of being able to weld, or join two pieces of metal together into an intimate and permanent union.

Welding is defined as the uniting of two pieces of iron or steel by heating them to a temperature moderately close to their melting point (but without actual fusion) at which they become pasty, and then forcing them into intimate contact whereby molecular cohesion takes place, producing a welded joint. Steads defines it as "the crystallization into union of two metallic surfaces, when they are brought together under suitable conditions."

All the iron carbon series are weldable, the steels yielding the most readily to the treatment.

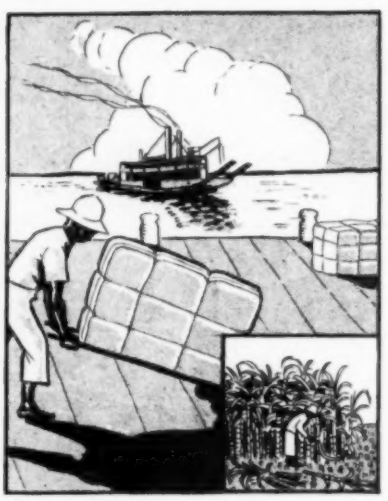
(Continued on Data Sheet No. 683)

Note—This sheet may be cut into two sections, 5 x 7 inches, and may be readily bound in note book form.

THE FOUNDRY DATA SHEET, AUG. 1, 1927
Payment will be made for all contributions on foundry and pattern shop practice suitable for publication

Seeing America with The Foundry

Little Journeys to the homes of our readers



LOUISIANA has a total of 31 foundries of which

25 Melt Gray Iron
5 Exclusive non-ferrous
11 Aluminum

LOUISIANA the CREOLE STATE has a semi-tropical climate, though, owing to the nearness of the Gulf, the intense heat is modified and the climate is equable. The average temperature for January is about 60 in the southern part, and about 45 in the northern, while in the summer the thermometer may rise as high as 100.

No other state has so many miles of navigable water as Louisiana. The Mississippi is the great state waterway. The Red River crosses the state from the northwest and joins the Mississippi, while the Ouachita enters near the northeastern corner and flows southward to near the middle of the state, before joining the Red. All these streams are navigable and it is possible to reach nearly all parts of the state by water.

Sugar refining is the leading manufacturing industry and this is followed by the making of cottonseed oil and cake and the lumber industry is next. Industries of less importance include the manufacture of tobacco products, bags, foundry and machine shop products; the raising and shipping of oysters employ a large number of people along the coast.

The mineral resources are limited. Petroleum is found in the southwestern part of the state, which contains an extension of the Texas oil field and the yield is now over 30,000,000 barrels yearly. Production of sulphur has been important since 1904, and now Louisiana produces nearly all the sulphur obtained in the United States—over 315,000 tons a year, valued at $6,000,000.

For the operation and maintenance of these various industries thirty-one foundries are operated.

In LOUISIANA—THE FOUNDRY has 21 paid subscribers

"Wherever metals are cast you'll find THE FOUNDRY"

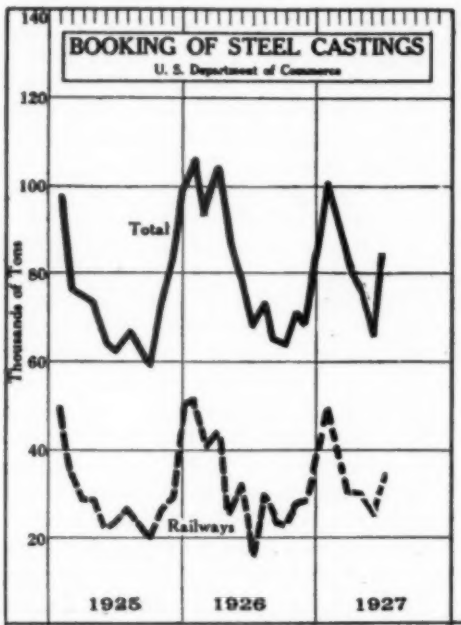
Trade Trends in Tabloid

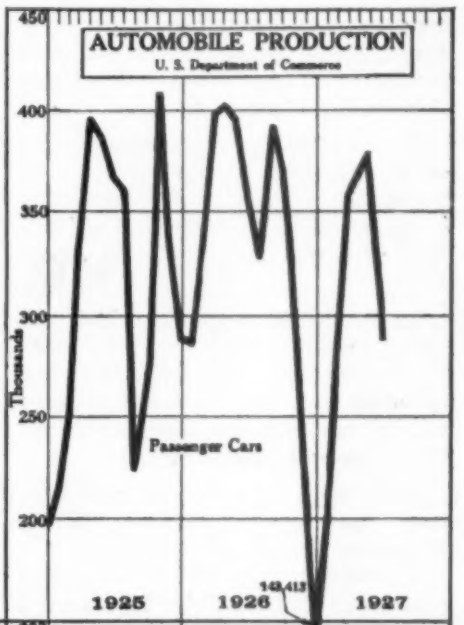
SUMMER dullness is showing marked inroads on the foundry industry. Eastern jobbing foundries are operating at from 33 1/3 to 50 per cent of capacity. With a slump of 20 per cent in production figures on total automobile production in June, compared with the previous month, the output of automotive castings has declined, but probably in not as great an amount as is indicated by the manufacturers' output report. Slowness in the development of the new Ford car and the withholding of new models on the part of makers of medium price cars until the last of July have had an effect upon schedules of finished cars, while the production of castings has gone forward. Cast iron pipe sales have declined and prices have reached the lowest level noted in five years. Increased capacity, foreign competition and the introduction of new process cast iron pipe through attractive price offers have contributed to this condition. Car loadings have declined. Sales of electrical machinery and sundries showed an increase for the first six months of 1927, compared with 1926, according to an announcement of the General Electric Co. Building construction figures show a slight decline, with consequent reaction upon purchases of radiation, sanitary ware, plumbing goods and miscellaneous building requirements. Foundry operation in Ohio registered 86.4 per cent during June.

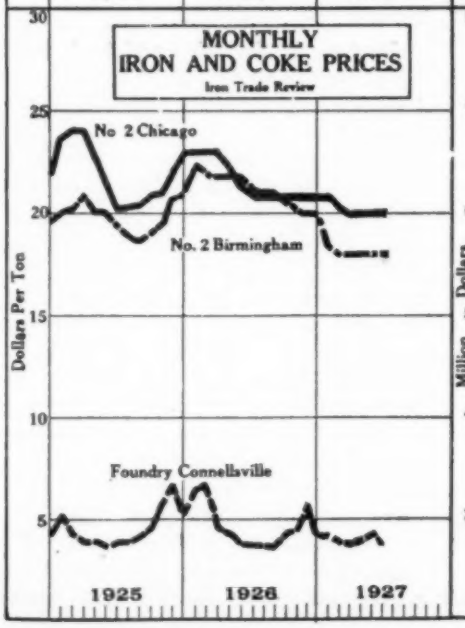
RAW MATERIAL PRICES

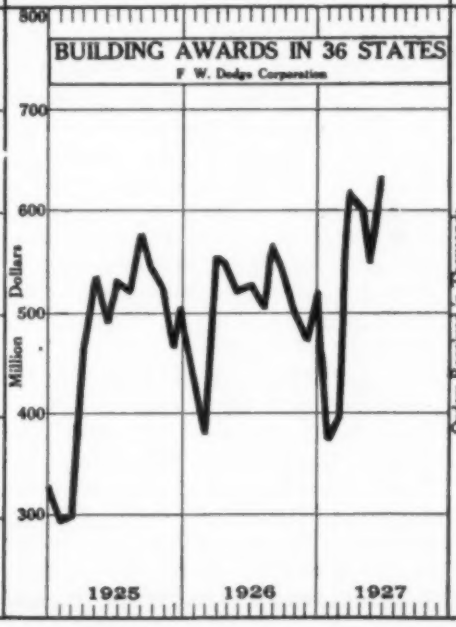
July 21, 1927

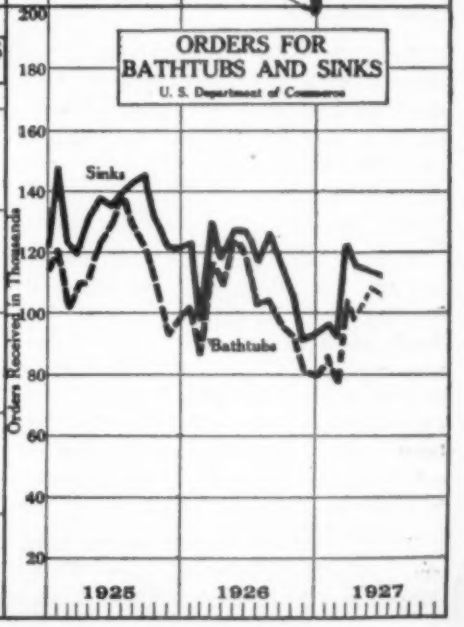
No. 2 foundry, Valley	$17.50 to 18.00
No. 2 southern, Birmingham	17.25
No. 2 foundry, Chicago	20.00
No. 2 foundry, Philadelphia	21.26 to 21.76
No. 2 foundry, Buffalo	17.00 to 17.50
Basic, Valley	17.50
Basic, Buffalo	17.00 to 17.25
Malleable, Chicago	20.00
Malleable, Buffalo	17.00 to 17.50
Coke	
Connellsville foundry coke	$4.00 to 4.50
Wise county foundry coke	4.00 to 5.00
Scrap	
Heavy melting steel, Valley	$15.50 to 16.00
Heavy melting steel, Pitts.	15.00 to 15.25
Heavy melting steel, Chicago	12.00 to 12.50
Stove plate, Chicago	12.25 to 12.75
No. 1 cast, New York	13.00 to 13.25
No. 1 cast, Chicago	14.75 to 15.25
No. 1 cast, Philadelphia	16.00 to 16.50
No. 1 cast, Pittsburgh	15.00 to 15.50
No. 1 cast, Birmingham	14.00 to 14.50
No. 1 cast, Buffalo	15.00 to 15.50
Car wheels, iron, Pittsburgh	15.00 to 15.50
Car wheels, iron, Chicago	13.50 to 14.00
Railroad malleable, Chicago	13.50 to 14.00
Agricultural, Mal., Chicago	13.00 to 13.50
Malleable, Buffalo	15.00 to 15.50
Railroad malleable, Pitts.	14.00 to 14.50
Nonferrous Metals	Cents per pound
Casting copper, refinery	12.62½
Electro copper, producers	12.87½
Straits tin	63.87½ to 64.00
Lead, New York	6.25 to 6.30
Antimony, New York	11.75 to 11.87½
Nickel, electro	39.00
Aluminum, No. 12, producers	24.50
Aluminum, No. 12, remelt	18.50 to 19.50
Zinc, East St. Louis, Ill.	6.22½ to 6.25











Comings and Goings of Foundrymen

M. L. JOHNSON, formerly in charge of sales of miscellaneous steel castings, Reading Steel Casting Co., Reading, Pa., has been appointed works manager, succeeding the late Walter N. Crafts. Mr. Johnson at one time was manager of the Sharon, Pa., plant, American Steel Foundries and later was treasurer and general manager, Lima Steel Casting Co., Lima, O. He also was associated with the Detroit Steel Casting Co., Detroit. Mr. Johnson will continue to supervise the sale of castings in connection with his new position.

J. Allison Himrod, formerly vice president and general manager, Allen Machine Co., has joined the Erie Foundry Co., Erie, Pa., and is now in charge of the rubber making machinery department.

H. H. Erklenz, former assistant works manager, Harnischfeger Corp., Milwaukee, has been appointed works manager to succeed E. Standfuss who was appointed vice president.

C. E. Swab, formerly chief engineer, Valley Mould & Iron Corp., Sharpsville, Pa., was appointed vice president in charge of the western district, with headquarters at Chicago. He is succeeded by L. J. Wilson.

John Boywid has been appointed gray iron foundry foreman, Illinois Malleable Iron Co., Chicago, to succeed Gottfrid Olson whose resignation was noted in the July 15 issue of THE FOUNDRY.

Mr. Cole, formerly metallurgist and chemist with the Alloy Steel & Mfg. Co., Los Angeles, Calif., now is chemist and metallurgist for the Stoody Co., Whittier, Calif. He also was chemist for Midvale Steel Co., Salt Lake City, Utah.

M. J. Beirn has been named general manager of sales by the American Radiator Co., Buffalo, to succeed Rudolph B. Flershem, who recently announced his resignation to become a vice president of the Marine Trust Co., Buffalo. Mr. Beirn, who has been assistant general manager of sales for the past five years assumed his new position on July 1.

W. L. Perkins, for 42 years manager of the Addyston Pipe Works, Addyston, O., branch of the United States Cast Iron Pipe & Foundry Co., Burlington, N. J., has retired from active service. Charles Steitz has been appointed manager to succeed Mr. Perkins.

R. J. Doty, for eight years vice president and chief operating executive for the Sivyer Steel Casting Co.,

R. J. DOTY

Milwaukee, has resigned his office and has terminated his connection with the company. He will devote his time for several months to private interests and expects to be identified next spring with another organization of a similar nature.

T. R. Collins, formerly production and sales manager, Buhl Malleable Co., Detroit, has been made assistant general manager of the Kalamazoo Malleable Iron Co., Kalamazoo, Mich. James Linklater, formerly works manager, Michigan Malleable Iron Co., Detroit, has been appointed works manager of the Kalamazoo company of which C. J. Edwards is president and general manager.

E. C. Belding, who recently became associated with the Stoody Co., Whittier, Calif., formerly was with the Ulmer Machine & Mfg. Co. Mr. Belding has been connected with the foundry industry for the past 27 years and served his time as a molder in the foundries of the Baker Mfg. Corp., Saratoga Springs, N. Y., and the General Electric Co., Schenectady, N. Y. He also was with the Gorham Co., Providence, R. I., for four years.

Joseph J. Swenson has been made salesmanager for the American Cast Iron Pipe Co., Birmingham, succeeding Paul A. Ivy, who resigned July 1. Mr. Swenson who formerly was in charge of the Los Angeles office of the company worked during the past 20 years following his graduation from the University of Georgia, filling successively the positions of time keeper, shipping clerk, shed foreman, inspector, traffic manager and in various outside sales offices of the American organization.

Paul D. Cravath, New York, a director and for more than 30 years general counsel for the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been elected temporary chairman to serve until a permanent successor is chosen for Guy E. Tripp, who died June 14. He was elected a director of the company in 1913, and is a member of the law firm of Gravath, Henderson & deGursdorff. Mr. Gravath was born at Berlin Heights, O., educated at Brooklyn Polytechnic institute, Brooklyn, N. Y., Columbia university New York and Oberlin college, Germany. During the war he represented the United States treasury on the house of representatives' mission to the interallied war conference at Paris. He has received decorations of honor from many countries, including the distinguished service medal presented him by General Pershing in 1919.

Burton L. Belack, assistant manager, Schenectady, N. Y., works of the General Electric Co., that city, since Dec. 1, 1926, has been appointed acting manager. He will fill the vacancy caused by the promotion of C. E. Eveleth, elected a vice president June 1. Edward A. Wagner, formerly of the Fort Wayne, Ind., works but since July, 1926, managing engineer in charge of all distribution transformers, with headquarters in Pittsfield, Mass., has been made acting manager of the Pittsfield works, succeeding Mr. Chesney, who has been a vice president in charge of manufacturing since the retirement of F. C. Pratt. Giuseppe Faccioli, works engineer of the Pittsfield works, has been appointed associate manager and works engineer of the Pittsfield works.

Issues Machinery Catalog

Goldens' Foundry & Machine Co., Columbus, Ga., recently has issued a 210-page catalog describing the various types of transmission machinery and accessories that it manufactures. The catalog is well illustrated from photographs and diagrams of the various products with their sizes and prices. Several pages are devoted to useful engineering data. Users of transmission machinery will find this catalog a valuable addition to their libraries.

Hold July Outing

The New England Foundrymen's association held an outing at Suntaug Inn, Lynnfield, Mass., on July 13. A dinner was served at 1:15 p. m. during which entertainment was provided. After the dinner a ball game between the foundrymen and supply men, and other athletic events were held. The next meeting of the association will be held in Providence, R. I., on Aug. 10.

Report on Corrosion

The second progress report on unprotected pipe, which covers the investigation being conducted by the United States bureau of standards on soil corrosion, recently has been published by the bureau as preprint No. 27-10. This report, which deals only with the problem of soil corrosion, contains information of great value to those interested in that phase of the investigation. The report may be obtained from the American Foundrymen's association, 140 South Dearborn street, Chicago, for 50 cents. The first progress report issued on the soil corrosion investigation, was printed in 1925 as preprint No. 447 and may be obtained from that office for 30 cents. H. Y. Carson, American Cast Iron Pipe Co., Birmingham, is chairman of the American Foundrymen's association committee on corrosion of metals.

Conference To Be Held

The twelfth annual summer conference for industrial executives will be held under the joint auspices of the departments of industrial engineering and engineering extension of the Pennsylvania State college, State College, Pa., from Aug. 22 to Sept. 3. The program will deal with organization problems and will include costs, personnel problems, factory location and layout, time study, wage payment plans, industrial economics and other topics of a like nature. Three discussions, lead by a faculty member, will be held each day during the two-week period. The club rooms, dining room and living quarters of the University club will be available to those attending the conference. Further information may be secured from Prof. C. W. Beese, head of industrial engineering department, Pennsylvania State college, State College, Pa.

Book Review

Engineering Index, published by American Society of Mechanical Engineers, 809 pages 6½ x 9¼ inches, cloth, supplied by THE FOUNDRY, Cleveland, for $6 to members of the society and $7 to non-members, and in Europe by Penton Publishing Co. Ltd., Caxton House, London, for 35 shillings, net.

An annual volume, this is part of the service of this society to its members and other mechanical engineers, supplementing the monthly digest of technical literature published in its journal.

The current volume covers 1926 and such numbers of publications for 1925 as arrived too late for inclusion in the preceding volume. Late publications in 1926 likewise will be included in the next volume.

A list of periodicals indexed is given and explanation of the photostatic and translation service rendered by the Engineering Societies Library. A guide to the use of the index makes its application clear.

F. S. Wheeler, chairman, American Can Co., New York, and W. B. Klee, former president, Damascus Bronze Co., Pittsburgh, have been made directors of the National Bearing Metals Corp., Pittsburgh.

Foundry Association Directory

American Foundrymen's Association

President, S. W. UTLEY, Detroit Steel Casting Co., Detroit; secretary-treasurer, C. E. HOYT, 140 South Dearborn street, Chicago; technical secretary, R. E. KENNEDY, 909 W. California street, Urbana, Ill.

The Buffalo Foundrymen
Buffalo

President, J. MCARTHUR, Washington Iron Works; secretary, W. J. WARK, E. J. Woodison Co., 146 Chandler street. Meetings the third Wednesday of the month at 146 Chandler street.

Chicago Foundrymen's Club
Chicago

President, G. H. ROLINSON, American Brake Shoe & Foundry Co.; secretary, ALBERT N. WALLIN, S. Obermayer Co., 2563 W. Eighteenth street. Meetings second Saturday in each month at the City club, 315 Plymouth court.

Connecticut Foundrymen's Association

President, FRED W. STICKLE, Capitol Foundry Co., Hartford, Conn.; secretary, C. S. NEUMANN, Union Mfg. Co., New Britain, Conn. Meetings are on second Friday of each month in various parts of the state.

Detroit Foundrymen's Association
Detroit

President, J. J. BOLAND, Griffin Wheel Co., Detroit; secretary, ROBERT HOPE, Holley Carburetor Co., Detroit. Meetings third Thursday in each month at the Union League club, 35 Grand River avenue, Detroit.

East Bay Foundrymen's Association
Oakland, Calif.

Secretary, H. L. MARTIN, Marchant's Foundry Co., 4401 East Tenth street, Oakland, Calif.

Metropolitan Brass Founders' Association
New York

President, WILLIAM EMBER, Jefferson Brass Foundry, 62 Delevan street, Brooklyn, N. Y.; secretary WILLIAM E. PAULSON, Thomas Paulson & Son Inc., 97 Second avenue, Brooklyn, N. Y. Meeting second Wednesday in each month at the Building Trades club, 34 West Thirty-third street, New York.

Newark Foundrymen's Association
Newark, N. J.

President, J. L. CARTER, Barlow Foundry Inc., Newark; secretary, W. H. MANTZ, Atlas Foundry Co., Irvington, N. J. Meeting called by President.

New England Foundrymen's Association

President, HENRY S. CHAFEE, Builders Iron Foundry, Providence, R. I.; secretary, FRED F. STOCKWELL, 205 Broadway, Cambridgeport, Mass. Meetings second Wednesday of each month at the Exchange club, Boston. Outings usually are held in the summer months.

Ohio State Foundrymen's Association

President, WALTER L. SEELBACH, Walworth Run Foundry Co., 2488 West Twenty-seventh street, Cleveland; secretary-manager, ARTHUR J. TUSCANY, 5713 Euclid avenue, Cleveland.

Philadelphia Foundrymen's Association
Philadelphia

President, WALTER WOOD, R. D. Wood & Co., Philadelphia; secretary HOWARD EVANS, Union League club, Philadelphia. Meetings the second Wednesday of each month at the Manufacturers' club.

Southern Metal Trades Association
Atlanta, Ga.

President, GEORGE B. COCKER, Gastonia, N. C.; secretary, W. E. DUNN JR., Healy building, Atlanta, Ga.

Pittsburgh Foundrymen's Association
Pittsburgh

President, C. D. CAREY, American Steel Foundries, Pittsburgh; secretary-treasurer, WILLIAM J. BRANT, Wm. J. Brant, Bessemer building, Pittsburgh. Meeting on the third Monday of the month, except in July and August, at Fort Pitt hotel.

Quad-City Foundrymen's Association
Davenport, Iowa

President, J. H. DIEDRICH, Blackhawk Foundry & Machine Co., Davenport, Iowa; secretary-treasurer, A. D. ZIEBARTH, Davenport Foundry & Machine Co., Davenport, Iowa. Meetings the third Monday evening of each month, the meeting place being rotated between Moline, Rock Island and Davenport.

Tri-City Technical Council
Moline, Ill.

Chairman, H. BORNSTEIN, Deere & Co., Moline, Ill.; treasurer, MAX SKLOVSKY, Deere & Co., Moline, Ill. Combined meetings held only one or two times a year on call.

Tri-State Foundrymen's Association
Cincinnati

President, HAROLD P. RITTER, John A. Oberhelman Foundry Co., 3323 Colerain avenue; secretary, GEORGE W. PIEHL, Wessling Bros. Foundry Co., 1607 McLean avenue. Meetings the second Thursday of each month at the Cincinnati club, Eighth and Race streets.

Twin City Foundrymen's Association
Minneapolis-St. Paul

President, H. H. NOTT, Smith System Heating Co., Minneapolis; secretary-treasurer, C. E. LANGDON, 3849 Lyndale avenue, south, Minneapolis. Meetings monthly at the Athletic club.

Iron Predominates

(*Concluded from Page* 607)

cast bars in white heart malleable in chilled molds and obtained better bending properties than when using ordinary molds. One speaker said that he had obtained white-heart malleable with a tensile strength of 73,000 pounds and 3 per cent elongation. C. Gresty, of the North-Eastern Marine Co. suggested to Mr. Fletcher that the variation of the combined carbon should be plotted on his curves. Mr. Robinson mentioned the case of adding nickel and chrome to the iron in the ladle. This a product easily machined at an extra cost of one cent per pound.

The next subject was "The Influence of Manganese and Manganese Sulphide on Whiteheart Malleable," by E. R. Taylor, Oldham. Mr. Cook pointed out that an iron giving 30 tons tensile strength and 3 per cent elongation would find many uses where a certain rigidity is wanted. In the United States, irons with great elongations had been obtained, but they are now returning to smaller figures. W. H. Poole, Bradford, said that he had obtained tests of over 67,000 pounds per square inch and an elongation as great as 17 per cent. The last paper, by F. A. Melmoth and T. W. Brown, of Sheffield, described the manufacture of a large steel casting, the subject being a cast steel propeller shaft bracket.

On the Friday morning, visitors were conducted to the Brown-Firth Research laboratories, the works of Darwins, Ltd., manufacturers of safety blades, Davy Bros., and Samuel Osborn & Co.

Meets Emergency

(*Concluded from Page* 614)

interviewing salesmen and she has sat on an improvised seat on the charging deck watching her gang charging the cupola exactly in the manner she wanted it charged.

When her chippers resented the introduction of pneumatic chipping hammers on the plea they caused headache, earache, pains in the back, the legs and the arms, she grabbed one of the hammers herself, ran it for an hour and shamed them into acceptance.

After seven or eight years of intense application she succeeded in building up a smoothly running organization and felt she needed a rest. She had a special automobile built and with a maid and a chauffeur she spent a year in making a tour of the world. This was in the early days of the automobile industry and her journey created as much of a sensation at that time as recent spectacular air flights have done in this year of grace 1927.

In 1925 she was married to S. E. Andrew, a former engineer officer in the navy of Argentina. Gradually Mr. Andrew assumed the active management of the plant and Mrs. Fisher-Andrew once more began to busy herself with various activities, civil, social and benevolent that claimed her attention before she became a foundryman. She divides her time between these interests and the management of a large farm surrounding her magnificent home on the outskirts of Trenton.

Has Charge of Office

A. L. Hollinger recently was appointed in charge of the Pittsburgh office of the Surface Combustion Co., New York, succeeding F. J. Winder who became associated with the Allegheny Steel Co. Mr. Hollinger formerly was in charge of the Chicago office of the firm for several years and will be succeeded by G. B. Ruby. O. R. Olson, formerly associated with W. N. Best Co., New York, and more recently with a midwestern furnace company also has joined the Pittsburgh staff.

Set Date for Ohio State Foundrymen's Meeting

Cedar Point, Ohio, Aug. 19 and 20, 1927 have been selected as the place and time for the annual convention of the Ohio State Foundrymen's association.

An interesting program of business topics has been arranged including addresses by Stuart Wells Utley, Detroit Steel Casting Co., Detroit, president of the American Foundrymen's association; Eugene W. Smith, Crane Co., Chicago; Phillip Frankel, Frankel & Frankel, Cleveland; and Willis Wissler, Ohio State University, Columbus.

Round table discussions on foundry costs and problems of interest to foundry operators will be arranged in connection with luncheons on the two days mentioned. An informal banquet will be held Friday evening, August 20. A. J. Tuscany, 5713 Euclid avenue, is secretary-manager of the association.

F. K. Armstrong, formerly associated with the New York sales branch, Ingersoll-Rand Co., New York, has been appointed manager of the newly established branch office of the firm at 236 High street, Newark, N. J.

Obituary

Alexander T. Drysdale, manager of the Dundalk (Baltimore) plant of the Central Foundry Co., who died at Baltimore on May 6, was born in Louisville, Ky., March 7, 1861 and received his education in the grade schools and high school of that city. He began his business career with the Snead & Co. Iron Works, Louisville, in the early eighties. In 1884 Mr. Drysdale severed his connection with that firm to join Dennis Long & Co., as draftsman and foreman of the pattern shop and continued in this capacity following its merger with the United States Cast Iron Pipe & Foundry Co. In 1905 he accepted the managership of the Sheffield Cast Iron Pipe & Foundry Co., and in 1909 was appointed superintendent of the Central Foundry Co.'s Dundalk plant. He returned to his former position with the Sheffield company in 1912 and remained there until the Sheffield plant was closed in 1916. Mr. Drysdale then was associated with the United States Cast Iron Pipe & Foundry Co., Burlington, N. J., and later at the Birmingham, Ala., plant of this firm. In 1918 he was placed in full charge of the Bessemer, Ala., plant of the Central Foundry Co., and in 1921 was made manager of the Dundalk plant, Baltimore.

Alexander T. Drysdale

Frederick J. Kingsbury Jr., chairman of the board and treasurer, Bridgeport Brass Co., Bridgeport, Conn., died on July 11 after a brief illness. He became affiliated with the company in 1895 as secretary and from 1912 to 1922 served as president of the organization. Five years ago he became chairman of the board of the Bridgeport company.

Will Hold Trade Fair

The International trade fair that has been held at Leipzig, Germany, for centuries will open on Aug. 28 and continue to Sept. 3. About 20 countries are expected to display their newest products. Information concerning the fair may be secured from the American offices located at 630 Fifth avenue, New York.

FIG. 1—THE SNAGGING WHEEL IS BONDED WITH BAKELITE

Designs Snagging Wheel

After extensive experimental work, the Norton Co., Worcester, Mass., recently has introduced a new grinding wheel for snagging work. Bakelite is used as the bonding agent in the new wheel, which is designed especially for high speed operation at 9000 surface feet per minute. It is claimed that the use of bakelite results in a wheel with the open structure of a vitrified wheel, but which can be operated with equal safety at the higher speeds. Another feature of the bakelite bond is that it is not affected by heat. The wheel has a comparatively large arbor hole, as shown in Fig. 1. Fig. 2 is a close up view showing the open nature of the bond.

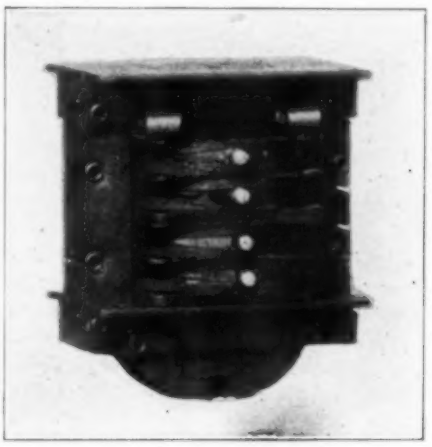
Flexibility Is Feature

A new line of solenoids, which has been placed on the market by the General Electric Co., Schenectady, N. Y., includes both alternating and direct current types and has been designed especially for uniformity and flexibility. The solenoids are made in all voltages and frequencies up to and including 500 volts.

FIG. 2—CLOSEUP VIEW OF SECTION OF WHEEL SHOWING OPEN BOND

Each size of solenoid has four types made with the same frame, which permits any solenoid to be adapted to a variety of applications. The alternating current solenoid may be adapted to direct current operation simply by changing coils and adding a cutout switch for which the frames are drilled. A pulling solenoid may be changed to a pushing solenoid by adding two standard pusher bars. The pole face of the plunger is cylindrical and fits into a cylindrical seat on the frame.

The coils are wound on molded compound spools which eliminate the possibility of grounds. Bakelite guides



COILS ARE HELD IN THE CORRECT POSITION BY SPRINGS

prevent the plunger from wearing the spool body. The coils are held in the correct position by springs which prevent vibration. On the direct current type one section of the coil consists of a high resistance which is short circuited by a cutout switch until the stroke is almost completed. The cutout switch then opens and inserts the winding. No external resistance is necessary. A view of one of the line of solenoids is shown in the accompanying illustration.

Saw Is Portable

D. W. Onan & Sons, 43-51 Royalston avenue, Minneapolis, has introduced a portable wood saw which incorporates numerous interesting features. The saw, which is shown in the accompanying illustration, is built entirely of steel. The top is 24 x 32 inches and is reinforced throughout, while the stand is 38 inches high. The machine is equipped with self-adjusting ball bearings running in dust

THE MACHINE HAS A PORTABLE DOLLY WITH RUBBER TIRED WHEELS

and oil-tight cases with an oil reservoir provided. Gages of steel for ripping, cross cutting and mitering are provided.

The machine regularly is furnished with an 8-inch all purpose saw blade. Rip, cross cut or any standard saw may be used. The saw runs 5000 revolutions per minute and travels 10,000 feet per minute at the rim. The machine is equipped with a portable dolly with rubber tired wheels. This feature is operated by a release lever which lowers the saw and allows the machine to rest firmly on the floor when in operation.

An 8-foot table may be formed with special extension side leaves which are made of wood bound with steel. A special heavy duty fully enclosed motor is used. The motor bracket is adjustable with a hand wheel for belt tension. The cord and plug is arranged to connect to any standard lighting socket.

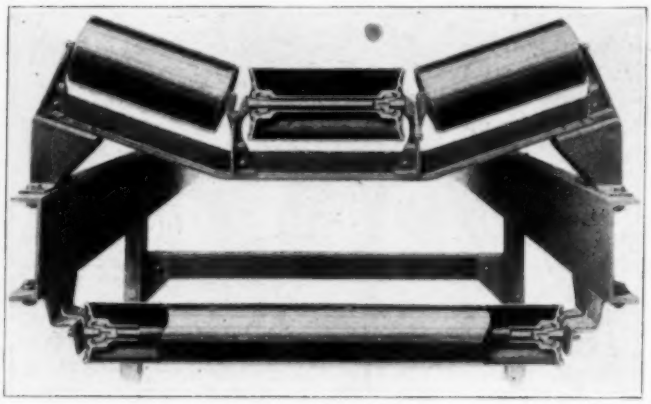
To Sell Sand Mixers

Pneulec Ltd., Smethwick, near Birmingham, England, has taken over the agency for the sand conditioning equipment manufactured by the Royer Foundry & Machine Co., Wilkes-Barre, Pa.

Appointed Representative

P. I. Perkins Co., 110 High street, Boston, has been appointed as representative for the Pennsylvania Pump & Compressor Co., Easton, Pa.

Recently the name of the Globe Malleable Iron & Steel Co., Syracuse, N. Y., was changed to Globe Forge & Foundries Inc.



BEARINGS ARE TOTALLY ENCASED IN THE ROLL HUB

Labyrinth Grease Seal Protects Bearings

Belt conveyor idlers and return rolls of special design, which are equipped with roller bearings recently have been introduced by the Link-Belt Co., 910 South Michigan avenue, Chicago. Bearings, made by the Timken Roller Bearing Co., Canton, O., are encased totally within the roll hub. Protection is afforded by a labyrinth grease seal mounted in a grease cap, which also serves as an outboard reservoir and lubricates the gearing on the outside as well as on the inside, especially when the roll is on the incline. The grease seal is protected by a deflector plate which deflects dirt, dust, grit or any foreign material away from the bearings and grease seal. The deflector plate also prevents grease from washing away from the labyrinth.

The rolls are mounted on a self-cleaning T-base. All rolls are interchangeable and may be used in any of the three positions. The idler rolls are supported in malleable iron brackets, which have a large surface for support. The brackets are constructed to support the ends of two adjacent rolls, thus giving the correct alignment. Rolls are spaced far enough apart to permit convenient removal from the frame. Rolls are made in various standard lengths and may be secured in combinations to suit standard belt widths.

Announce Fall Meeting of Institute of Metals

The regular fall meeting of the Institute of Metals division of the American Institute of Mining and Metallurgical Engineers will be held in Detroit, Sept. 20 to 22 in connection with the annual convention of the American Society for Steel Treating. Papers to be presented will deal with the heat treatment of copper, aluminum, nickel, zinc and their alloys. Technical sessions will be held in the Book-Cadillac hotel. An exhibition will be held from Sept. 19 to 23 under the auspices of the American Society for Steel Treating which will include nonferrous exhibits of interest to the member of the division.

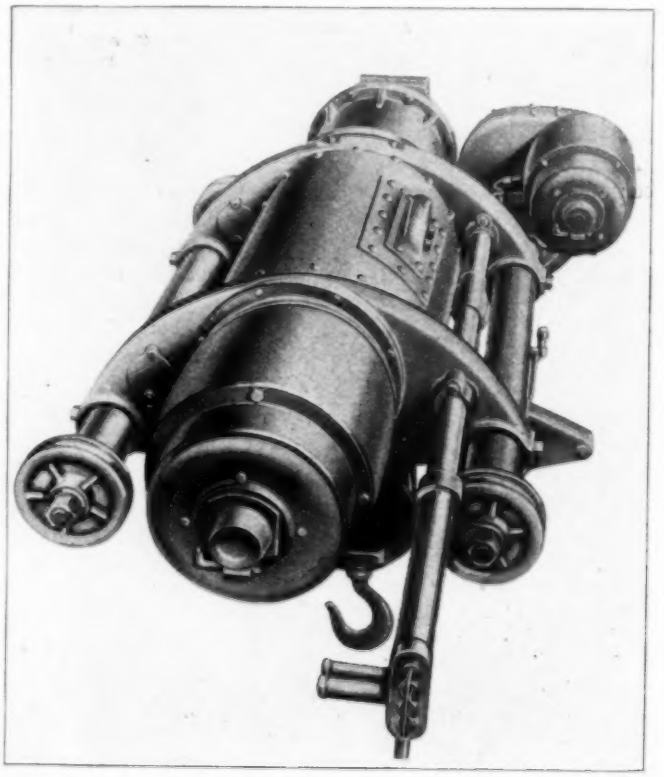
This is the first time that the institute has met with the steel treating society. Arrangements have been made with the railroads for the round trip certificates. The certificates may be secured from W. M. Corse, secretary of the division, 810 Eighteenth street, Washington.

Small Headroom Features New Crane

The Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., has introduced a new type of crane trolley designed to give a small clearance. The load carrying frame is constructed entirely of steel. The frame is carried by axle brackets which consist of heavy seamless drawn steel tubes passing through bored openings in the girts. The longer winding drum of the new trolley permits grooving of a coarser pitch for a given size of rope, to a depth exceeding half the diameter of the rope. The drums are cast semisteel.

Two optional types of mountings for the hoist motor are provided. It may be mounted by bolting the field frame to the motor and adapter, or on its base with a motor end adapter. This affords a horizontal shelf to which the motor is bolted. The trolley motor, like the hoist motor, may be mounted by bolting its field frame to an adapter, or on its feet on a shelf near the center of the driven axle bracket. Any type of motor, solid or split frame or appropriate size, may be used.

Trolley axles are of heavy construction. The bearings are waste packed and supplied with oil cellars communicating with a pool retained within the axle bracket tubes. Oil for all four bearings is supplied through a single pipe connecting both axle bracket tubes. Trolley wheels are fastened to the axles securely. The wheel at one end of each axle is pressed or shrunk on and the wheel at the opposite end is drawn onto a taper by a nut. Trolley gearing, although similar to former designs of the Shepard company, has gears of larger diameter and a higher gear ratio. The load block is enclosed fully.



TROLLEY WHEELS ARE FASTENED TO THE AXLES SECURELY

Uses Roller Bearings

The heading on the article describing a new sand mixing machine made by the Standard Sand & Machine Co., Cleveland, which appeared in the July 15 issue of THE FOUNDRY on page 583, stated that ball bearings are used on the machine. This statement is in error since roller bearings made by the Timken Roller Bearing Co., Canton, O., are used on the moving parts of the mixer. The use of roller bearings is explained correctly in the body of the article which also covers many other details.

Summer Dullness Continues

Slackness in Foundry Operations and Absence of Buyers During Vacation Period Causes Decline in Orders for Foundry Equipment

SEASONAL influences have caused a slackening in the demand for foundry equipment in the various distributing centers. Due to the let up in foundry operations and to the vacation period, the purchase of new equipment is light. Manufacturers feel that market conditions will not become much better until after Sept. 1.

Small equipment is finding a ready market in the Cleveland territory, but sales of larger units continue to lag. Inquiries are slow to develop and many plants delay making purchases for a considerable time after quotations are made. The Ferro Machine & Foundry Co., Cleveland, making automobile castings, has purchased the plant of the Interstate Foundry Co. which has been idle for some time, and is buying new equipment to produce cylinder blocks on a production basis.

Sellers of foundry equipment in the Pittsburgh area are encountering a spotty market. This condition is attributed to the fact that many foundries are operating on a 33 1/3 to 50 per cent basis. Many inquiries have been before the trade for a number of weeks, with no indication of an early closing. Practically all purchases are being made to cover only immediate needs. However, many foundries appear to be taking advantage of the slack period to improve molding machine departments and a number of orders of from one to four machines have been secured by one machine manufacturer. It is understood that a foundry in Bridgeville, Pa., is asking for bids on sandblast equipment.

Sluggishness continues the feature of the Eastern market. Except for one or two instances, large orders have been lacking during the month. Little foundry construction is under way or planned, and with foundry operations at a low point, equipment replacements are not heavy. One of the major developments has been the purchase of equipment for a new steel foundry by the Chateaugay Ore & Iron Co., Lyon Mountain, N. Y. The Brooklyn Union Gas Co., Brooklyn, N. Y., is making alterations in its foundry which may require some new equipment. Crane sellers report foundry demand unusually slack.

EASTERN MARKET

Core Ovens

Chateaugay Ore & Iron Co., Lyon Mountain, N. Y., three core ovens from the Foundry Equipment Co., Cleveland.

Molding Machines

Hunt-Spiller Mfg. Corp., South Boston, Mass., four machines; Crane Co., Bridgeport, Conn., two machines; Chapman Valve Mfg. Co., Indian Orchard, Mass., one machine from the Herman Pneumatic Machine Co., Zelienople, Pa.

Sand Preparing Equipment

Foran Foundry & Mfg. Co., Flemington, N. J., New York Central Railroad Co., Frankfort, N. Y., one sand separator and blender each from the Royer Foundry & Machine Co., Wilkes-Barre, Pa.

Miscellaneous

Chateaugay Ore & Iron Co., Lyon Mountain, N. Y., converter, cupola, cranes, tumbling barrels and other equipment from the Whiting Corp., Harvey, Ill.; exhaust fan equipment from the Clarage Fan Co., Kalamazoo, Mich.; oil burner preheaters from the Hauck Mfg. Co., Brooklyn, N. Y.

CLEVELAND MARKET

Furnaces

Parker-Street Castings Co., Cleveland, one cupola from the Whiting Corp., Harvey, Ill.

Molding Machines

National Foundry Co., Erie, Pa., two machines; O. S. Kelly Co., Springfield, O., Griffin Wheel Co., Cincinnati, O., Sterling Foundry Co., Wellington, O., Michigan Valve & Foundry Co., Detroit, Superior Gas Engine Co., Springfield, O., one machine each from the Herman Pneumatic Machine Co., Zelienople, Pa.

Sand Preparing Equipment

American Radiator Co., malleable plant, Buffalo, Walworth Run Foundry Co., Cleveland, one sand separator and blender each from the Royer Foundry & Machine Co., Wilkes-Barre, Pa.

Shakeout Equipment

Fremont Foundry Co., Fremont, O., Brown Car Wheel Co., Buffalo, N. Y., shakeout bails; Griffin Wheel Co., Detroit, Holmes Foundry Co., Port Huron, Mich., Henry Furnace & Foundry Co., Medina, O., American Radiator Co., Buffalo, N. Y., vibrator and shakeout equipment from the Stoney Foundry Engineering & Equipment Co., Cleveland.

CHICAGO MARKET

Molding Machines

Maynard Electric Steel Casting Co., Milwaukee, two machines; American Manganese Steel Co., Chicago Heights, Ill., Yates-American Machine Co., Beloit, Wis., Evans & Howard Fire Brick Co., St. Louis, Weil-McLain Co., Michigan City, Ind., one machine each from the Herman Pneumatic Machine Co., Zelienople, Pa.

Sand Preparing Equipment

Wanner Malleable Castings Co., Hammond, Ind., Mueller Fountain & Fixture Co., Decatur, Ill., one sand separator and blender each from the Royer Foundry & Machine Co., Wilkes-Barre, Pa.

Rockwood Mfg. Co., Indianapolis, Perfect Circle Co., New Castle, Ind., one sand separator and blender each from the Royer Foundry & Machine Co., Wilkes-Barre, Pa., through the Fenton Foundry Supply Co., Dayton, O.

Shakeout Equipment

American Steel Foundries, East St. Louis, Ill., Peru Foundry Co., Peru, Ind., Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., Griffin Wheel Co., Kansas City, Kans., vibrator and shakeout equipment from the Stoney Foundry Engineering & Equipment Co., Cleveland.

PITTSBURGH MARKET

Molding Machines

Tennessee Coal, Iron & R. R. Co., Birmingham, Ala., two machines; Kelly Foundry Co., Pittsburgh, Shenango Furnace Co.; Sharpsville, Pa., Oil Well Supply Co., Oil City, Pa., Thomasville Iron Works, Thomasville, Ga., J. S. McCormick Co., Pittsburgh, Robert Mitchell Co. Ltd., Montreal, Que., Reliance Steel Casting Co., Pittsburgh, one machine each from the Herman Pneumatic Machine Co., Zelienople, Pa.

Sand Preparing Equipment

American Car & Foundry Co., Berwick, Pa., sand separator and blender from the Royer Foundry & Machine Co., Wilkes-Barre, Pa.

Shakeout Equipment

Bessemer Gas Engine Co., Grove City, Pa., shakeout bails; Conemaugh Iron Works, Blairsville, Pa., Westinghouse Air Brake Co., Wilmerding, Pa., vibrator and shakeout equipment from the Stoney Foundry Engineering & Equipment Co., Cleveland.

New Trade Publications

CONVEYORS—Mathews Conveyor Co., Ellwood City, Pa., tells the story of its equipment largely in pictures in a catalog just issued. A few pages of text are devoted to modern foundry transportation. The remainder of the catalog is devoted to illustrations showing varied uses of its conveyors in foundry work. Typical layouts also are shown. Engineering data and blueprints of details round out the publication.

LUBRICATOR EQUIPMENT—Alemite Lubricator Co. is circulating a bulletin calling attention to its lubricating devices for industrial use. Illustrations show appliances and method of using and a number of installations. Ease and thoroughness of application are stressed.

ELECTRIC MOTOR ACCESSORIES—Union Electric Mfg. Co., Milwaukee, has published a number of of bulletins covering its line of controllers and accessories for various types of electric motors.

MOTOR INSTALLATION—General Electric Co., Schenectady, N. Y., has published the

first edition of a manual for dealers covering the mechanical installation of electric motors and control. Information contained in this manual is of value to all users of motors.

NICKEL—A pamphlet containing reprints of advertisements has been issued by the International Nickel Co., New York. Its purpose is to indicate effect of nickel in cast iron to promote machinability and wear resistance.

MOTORS—Wagner Electric Corp., St. Louis, is issuing a bulletin describing construction and characteristics of its line of alternating current motors. Economy from the proper power factor is discussed.

TRAMRAILS—Cleveland Electric Tramrail division of the Cleveland Crane & Engineering Co., Wickliffe, O., has issued a bulletin calling attention to the economy of handling large loads in moving products and materials about a plant. Use of its devices to multiply manpower is suggested.

ELECTRICAL EQUIPMENT—General Electric Co., Schenectady, N. Y., has issued several bulletins. They cover station oil circuit breakers, self-synchronous units for industrial and central station applications and induction motor panels. The latter is comprehensive and presents full engineering data.

ELEVATORS—Link-Belt Co., Chicago, adds to its series of books one on typical elevators. It includes illustrations, examples, ratings, capacities and tables showing how to select typical elevators. The elevators illustrated are capable of handling a large variety of materials in bulk.

WORM GEARS AND DRIVES—Fawcus Machine Co., Pittsburgh, has issued a catalog covering a new line of worm gear speed reducers, equipped with roller bearings. It contains illustrations of typical installations and engineering data.

PRECISION DEVICES—Stanley P. Rockwell Co., Hartford, Conn., has added a leaflet to its book of bulletins, covering its hardness tester and its device for controlling heat treatment.

FORGED CAST GEARS—Hill Clutch Machine & Foundry Co., Cleveland, calls attention in a leaflet to advantages of its gears. They consist of forged steel teeth and a semi-steel hub. Added strength of teeth is a feature. Various types of gears are illustrated.

SAND-BLAST EQUIPMENT—Ruemelin Mfg. Co., Minneapolis, has issued a 4-page folder describing some of its types of sand blast equipment, dust arresters, and accessories.

STEEL BOXES—Platforms and steel boxes for handling materials in industrial plants are shown in a bulletin by the Truscon Steel Co., Youngstown, O. Strength and lightness are featured.

COAL CARBONIZATION—International Combustion Engineering Corp., New York, has issued a 12-page folder describing its process for the low temperature carbonization of coal. This process was developed in Germany and the solid product is a semi-coke which may be used industrially as a smokeless fuel.

What the Foundries Are Doing

Activities of the Gray Iron, Malleable, Steel and Brass Shops

Buffalo Forge Co., 477 Spring street, Buffalo, contemplates extensions to its present plant.

Miller Foundry Co., Columbus, O., will build a new 1-story foundry building.

George W. Grimes Foundry Co., Bluffton, Ind., was damaged by a recent fire.

Brooklyn, Union Gas Co., Brooklyn, N. Y., has awarded the steel contract for its foundry and machine shop to McClintic-Marshall Co.

Fox Furnace Co., Elyria, O., M. Suppes, Woodford avenue, manager, will build a 1-story foundry building.

Miller Machine & Mold Works, Columbus, O., A. G. Doll, 19 Ann street, manager, will build a 1-story foundry building.

Sullivan Machinery Co., Claremont, N. H., will build a power house and install equipment. Charles T. Main Inc., 201 Devonshire street, Boston, is architect and engineer.

The Ferro Machine & Foundry Co., Cleveland, has purchased the plant of the Interstate Foundry, that city, and is installing equipment to produce automobile cylinders.

Reliable Foundry Co., 1 Mt. Harrison street, Dayton, O., W. H. Placke, general manager, is inquiring for complete equipment for a foundry. (Noted July 15).

Oklahoma Steel Castings Co., 1200 North Peoria street, Tulsa, Okla., has been incorporated by Ernest H. Cornelius, Burtner Fleeger and L. C. Raston.

H. S. Lee Foundry & Machine Co., Plymouth, Mich., will build an addition 50 x 70 feet to its present plant, to give an added capacity of five tons per day.

Rustic Well Foundry, New York, has been incorporated with $10,000 capital to manufacture metal decorative pieces by D. L. Sprung, 7 East Forty-second street.

Messmer Mfg. Co., 2700 South Seventh street, St. Louis, will build a 2-story brass foundry addition. O. J. Krieg, Wainwright building is architect.

The Wanner Malleable Castings Co., Hammond, Ind., was damaged by fire on June 25 to the extent of $20,000. The damage has been repaired and the part of the plant which was damaged again is in operation.

Approval of the construction of new buildings for the Chicago Pneumatic Tool Co., Franklin, Pa., recently has been given. These additions which will double the production of the two plants will involve an outlay from $500,000 to $700,000.

Zoll Foundry Co., Roselle Park, N. J., has been incorporated with $100,000 capital to make metal castings, by Edward H. Zoll, Joseph C. Zoll and Stanley W. Zoll. Nicholas W. Kaiser, Newark, is attorney.

Health-Ware Co., Hawthorne, Calif., manufacturer of aluminum ware has moved its entire factory here from Glendale, Calif., and expects to put its foundry into operation shortly at Hawthorne.

Penn Mold & Iron Co., Sharpesville, Pa., is finishing removal of its plant from Dover, O., to Sharpesville, following purchase by W. P. Snyder & Co. Reorganization as the Shenango-Penn Mold Co. is underway.

Triangle Foundry Co., East Alton, Ill., now is in operation manufacturing gray iron, brass and aluminum castings. The company is owned and operated by D. D. Hughey and M. B. Dewey.

Farrell-Cheek Steel Foundry Co., Sandusky, O., J. E. Sweet, secretary, has awarded the general contract for its 1-story steel foundry addition to G. William Doerzbach Co., 644 Camp street.

Curtain Supply Co., Elkhart, Ind., has awarded the general contract for a 1-story foundry addition to its South Bend, Ind., branch to Ralph Sollitt Construction Co. (Noted July 15).

Blackhawk Foundry & Machine Co., Davenport, Iowa, has purchased the plant of the Davenport Vinegar & Pickling Works and will remodel a portion of the building for foundry use.

Frank Foundries Corp., Moline, Ill., will build a new foundry on newly acquired property. Other buildings, including warehouses and storage building will be built later in the year.

Wisconsin Appleton Co., South Milwaukee, Wis., which has taken over the malleable plant of Stowell Co., has awarded the general contract for three foundry additions to Austin Co., Cleveland. H. J. VanBeek is vice president in charge.

John Deere Tractor Co., Waterloo, Iowa, manufacturer of gas and gasoline engines, parts and kindred products, has awarded the general contract for a 1-story addition, 120 x 300 feet, to Jens Glesen & Sons Construction Co., 1522 Lafayette street. O. A. Meckerman, Moline, Ill., is architect.

Kalamazoo Malleable Iron Co., Kalamazoo, Mich., has completed two additions to its plant, of brick and steel construction. The added space provides facilities for previously crowded departments. New air compressing, sand blasting and hydraulic pressing equipment has been installed.

Stephens Adamson Mfg. Co. of Canada Ltd., Belleville, Ont., a subsidiary of the Stephens Adamson Mfg. Co., Aurora, Ill., recently incorporated with a capital of $125,000 has started the manufacture of conveying, elevating and transmission machinery. The plant is equipped with structural and machine shops with pattern and foundry departments. C. A. Freeman has been appointed general manager.

Milwaukee Valve Co., Milwaukee, manufacturer of valves and other plumbing and heating brass goods has increased its capital from $100,000 to $250,000. Val Fina, formerly president and general manager, Clum Mfg. Co., Milwaukee, recently acquired an interest in the firm and has become vice president and works manager. John Fraser Jr. is president and general manager.

Chateaugay Ore & Iron Co., Lyon Mountain, N. Y., has awarded substantial contracts for equipment for a new foundry, with a capacity of at least 50 to 60 tons daily. The new foundry will produce mine wheels, soil pipe and a variety of other products and will provide a partial outlet for Chateaugay's pig iron output. The Chateaugay Ore & Iron Co. is affiliated with the Delaware & Hudson railroad and the Hudson Coal Co.

Prescott Iron Works, Seattle and Menominee, Mich., have been merged creating a corporation with capital in excess of $1,000,000, according to a statement of Sumner K. Prescott, president and founder of the Seatle firm. The Michigan plant is owned by members of the Prescott family and is a large manufacturer of sawmill machinery. The purpose of the merger is to transfer to the Seattle plant manufacture of the heavy machinery formerly built in the Menominee plant for the Pacific coast trade. The Michigan plant is operated by Fred M. Prescott, president and Loren L. Prescott, vice president.